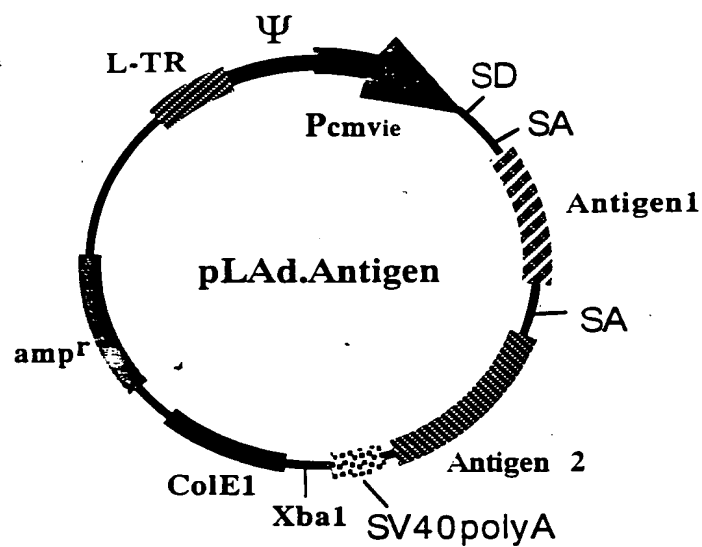
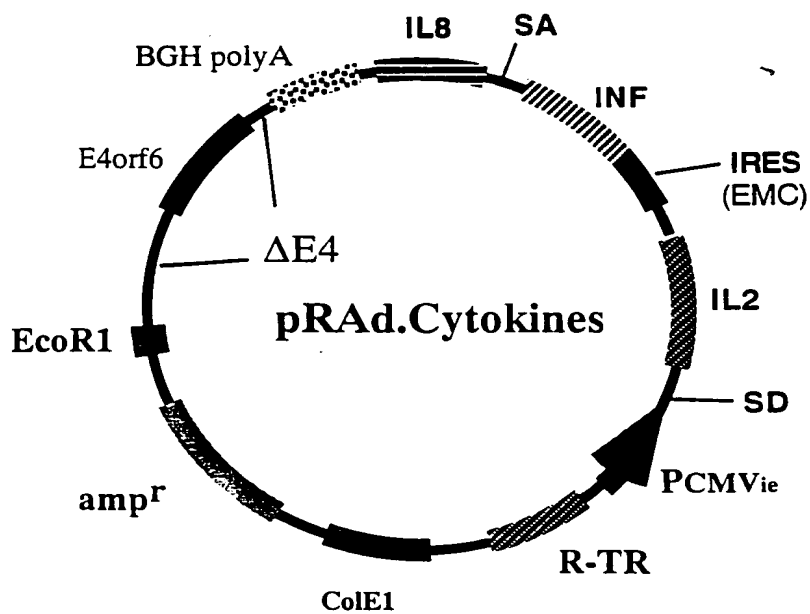


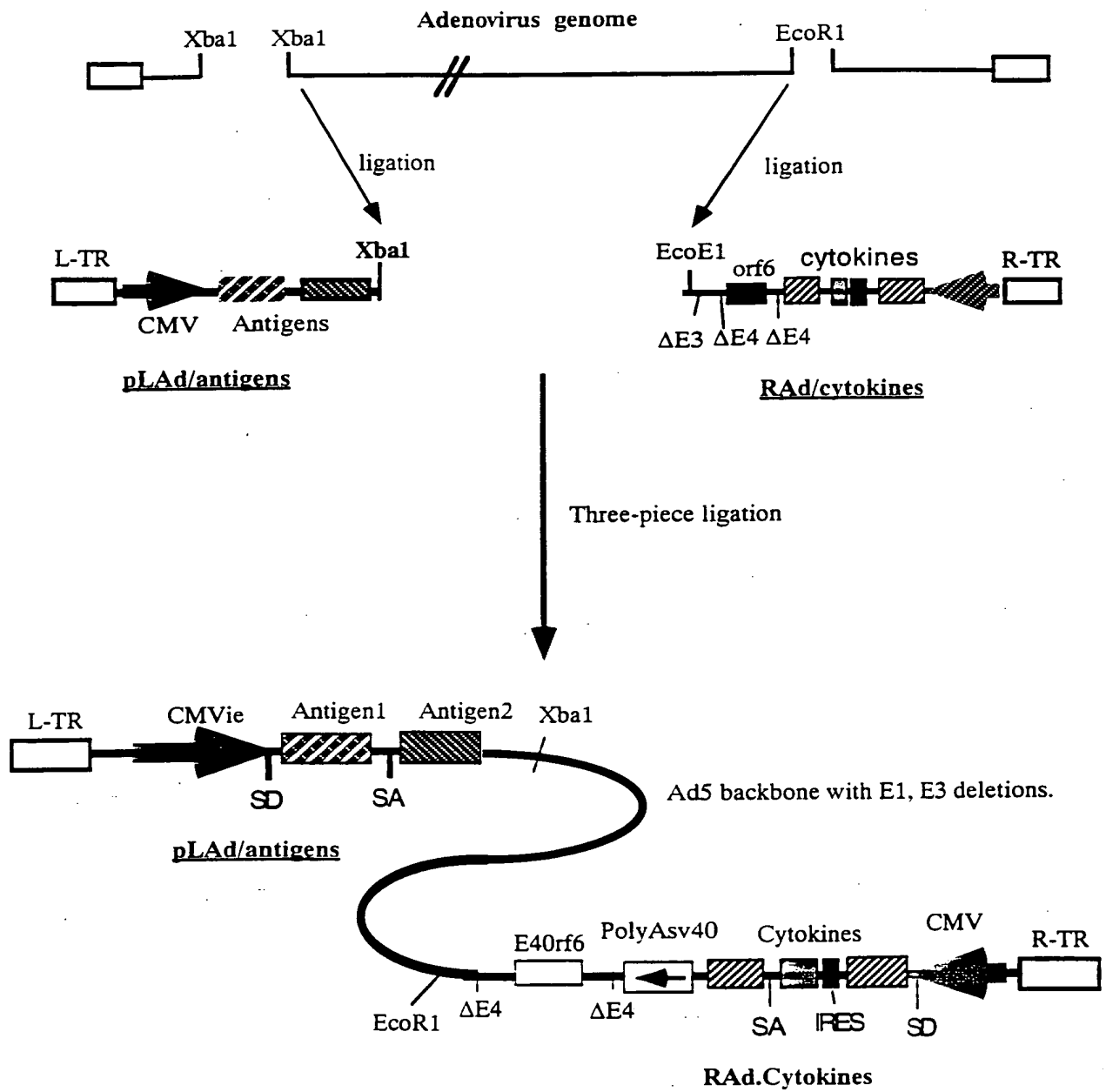
**FIGURE 1A**



**FIGURE 1B**

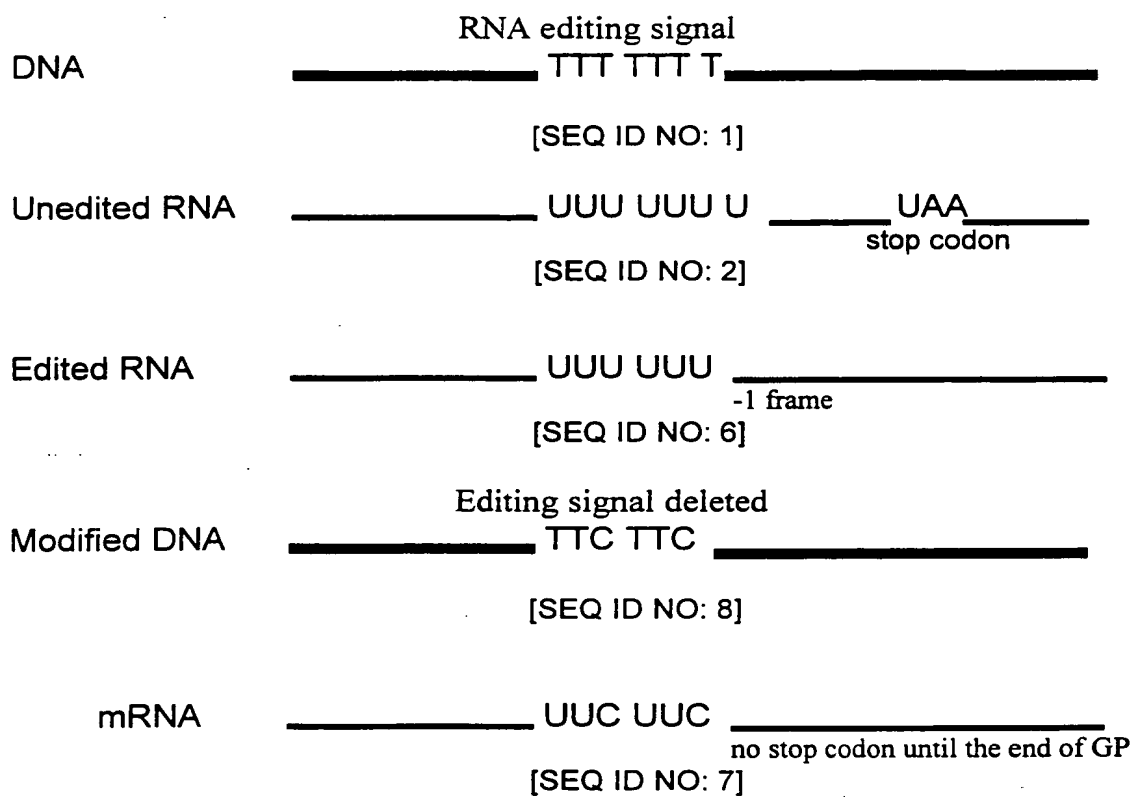


**FIGURE 1C**



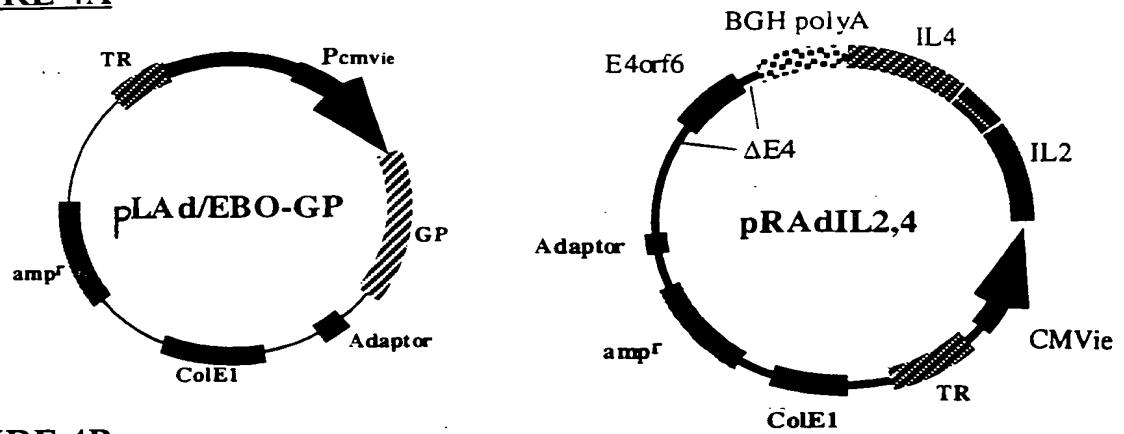
20121010 04:24:02

**FIGURE 2**

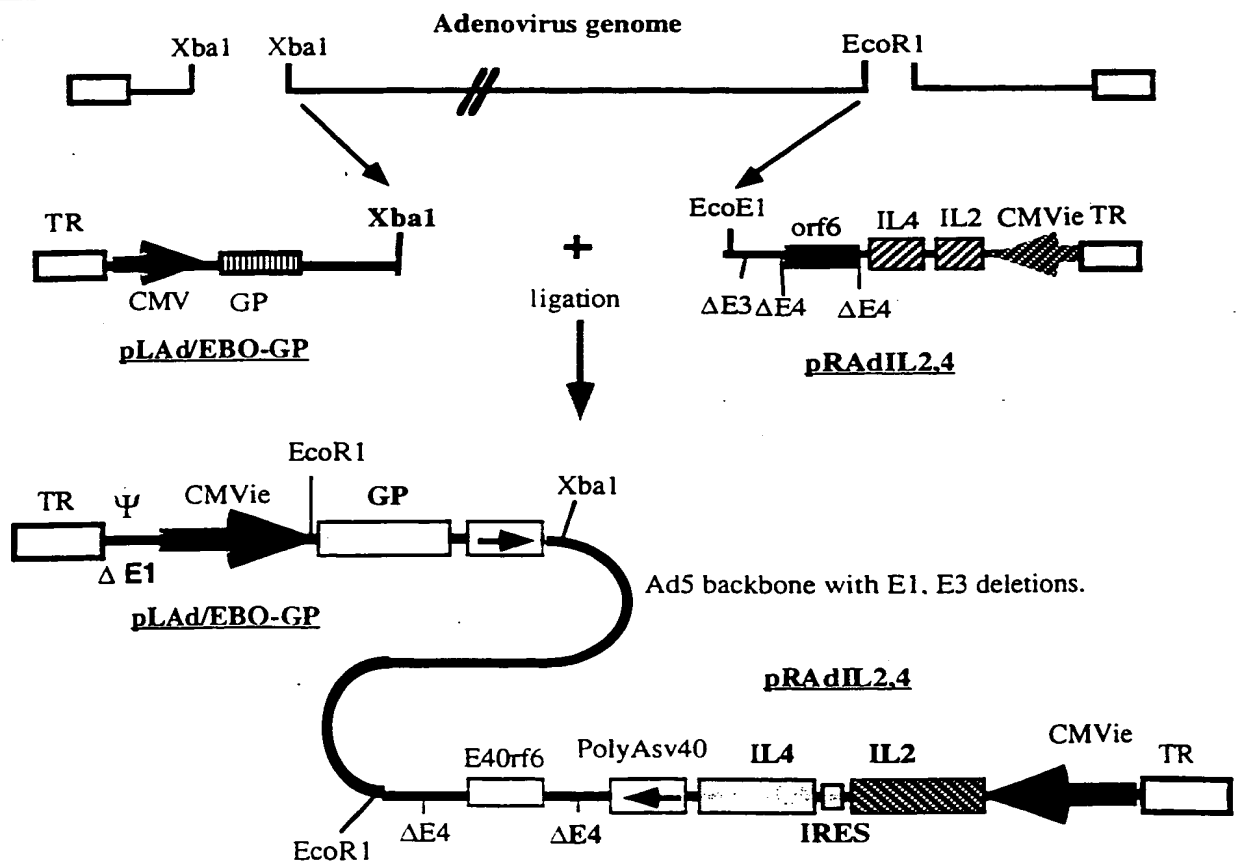




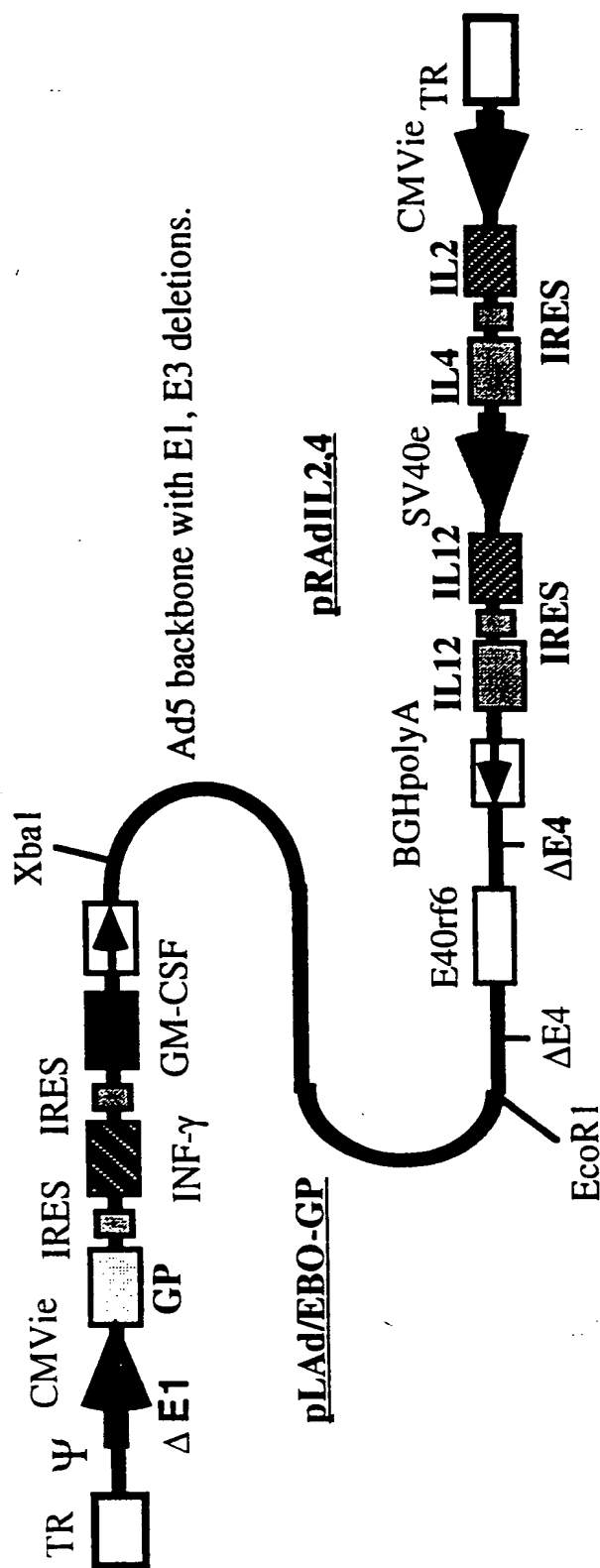
**FIGURE 4A**



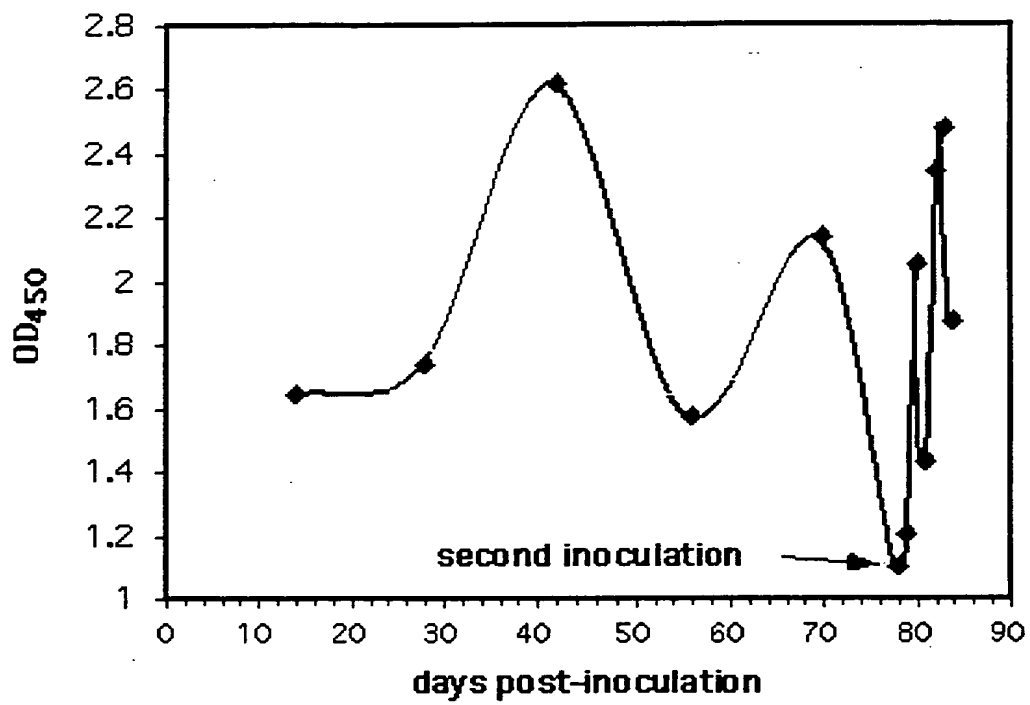
**FIGURE 4B**



**FIGURE 5**

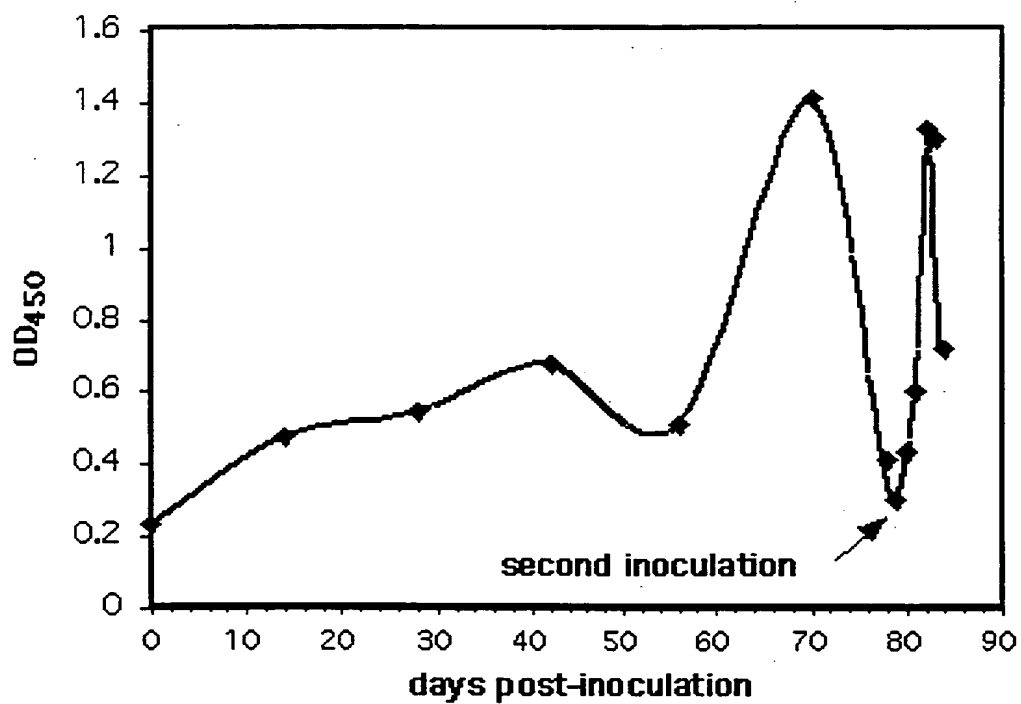


Anti-HIV (tat,env) relative titer  
(Group 3)



**FIGURE 6**

Anti-HIV (tat,env) relative titer  
(Group 4)



**FIGURE 7**



IFN $\gamma$  secretion from activated splenocytes in response to target cell stimulation

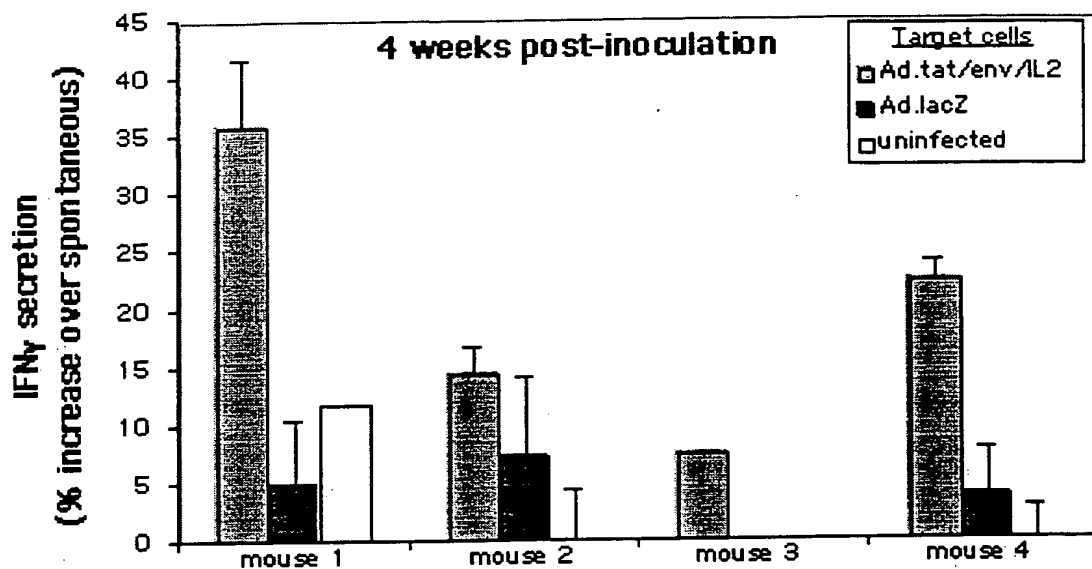
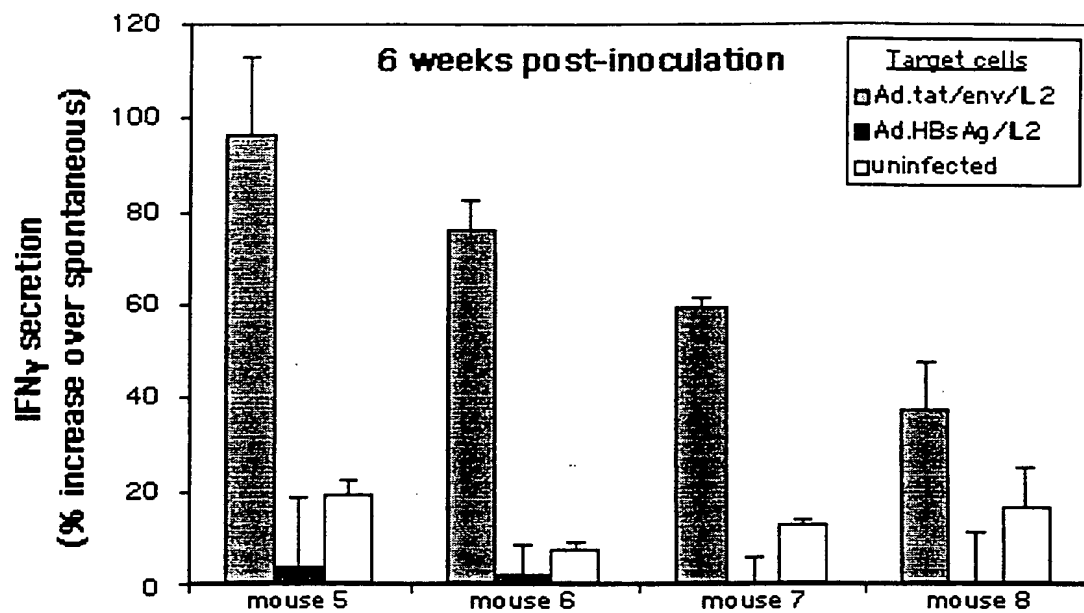


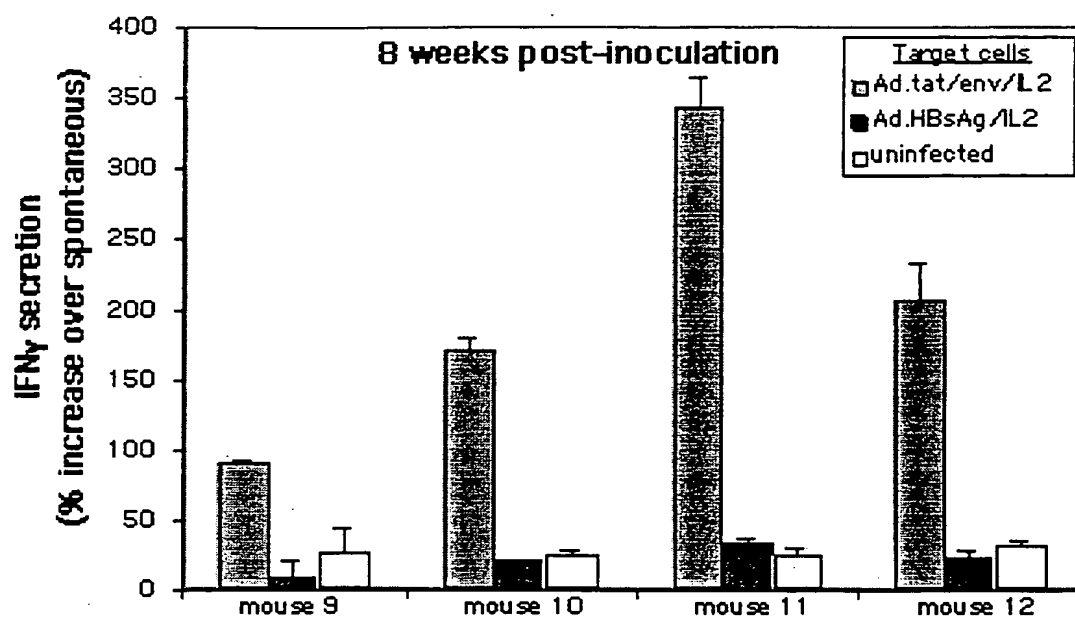
FIGURE 8A

IFN $\gamma$  secretion from activated splenocytes in response to target cell stimulation



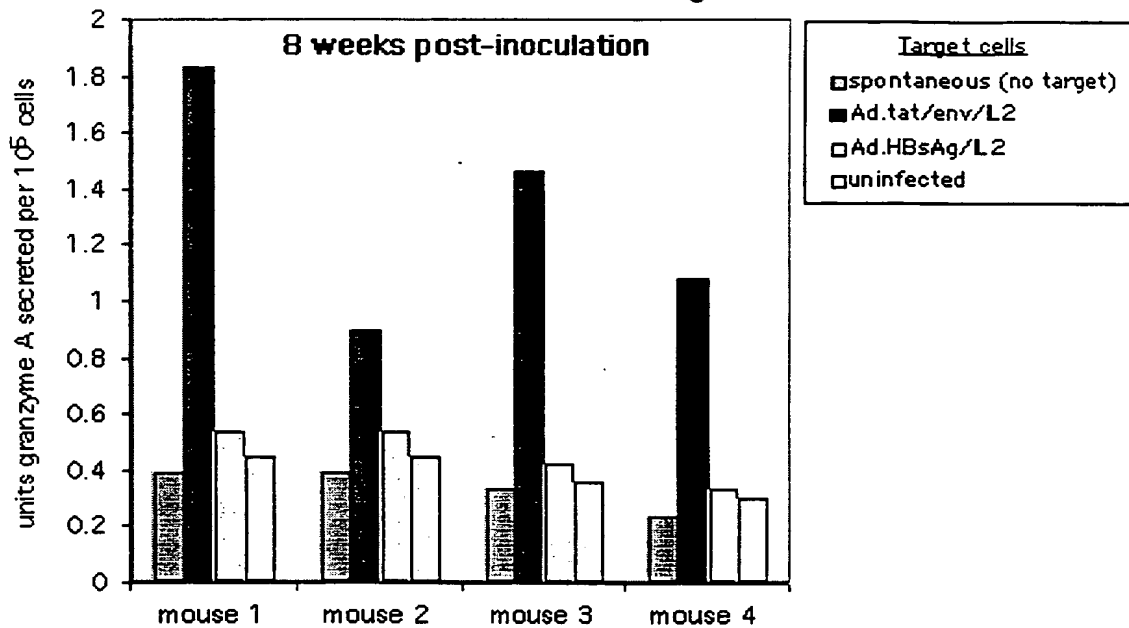
**FIGURE 8B**

IFN $\gamma$  secretion from activated splenocytes in response to target cell stimulation



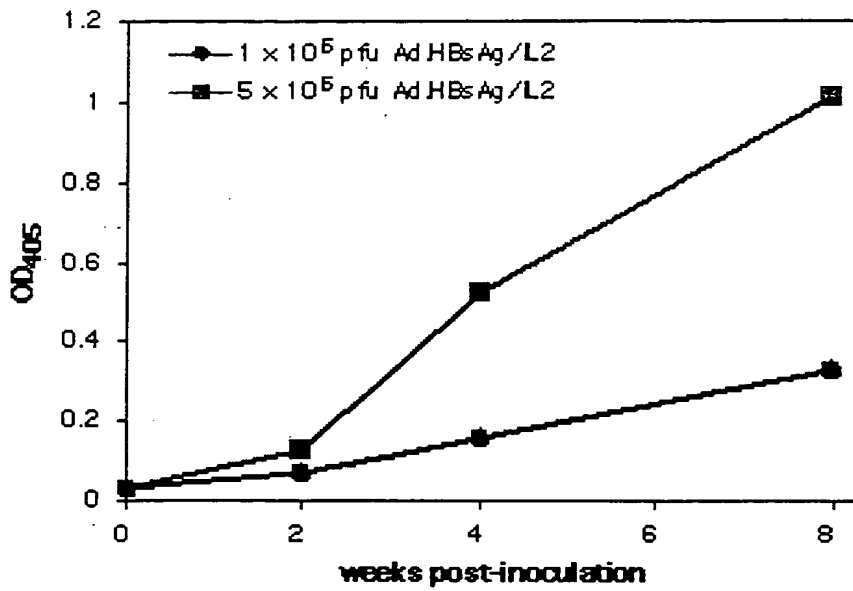
**FIGURE 8C**

Granzyme A secretion from activated splenocytes in response to stimulation with target cells



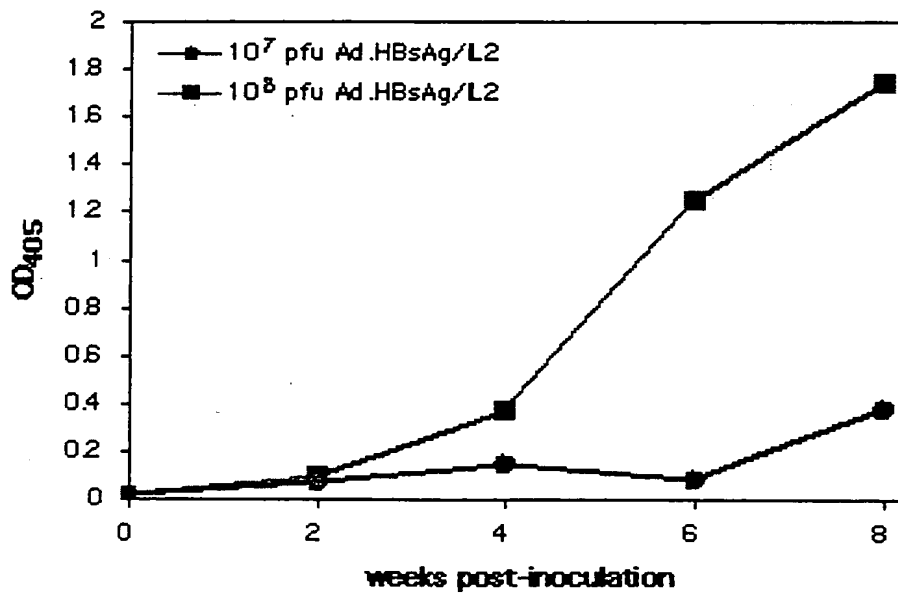
**FIGURE 9**

Anti-HBsAg relative titer  
(Group 1)



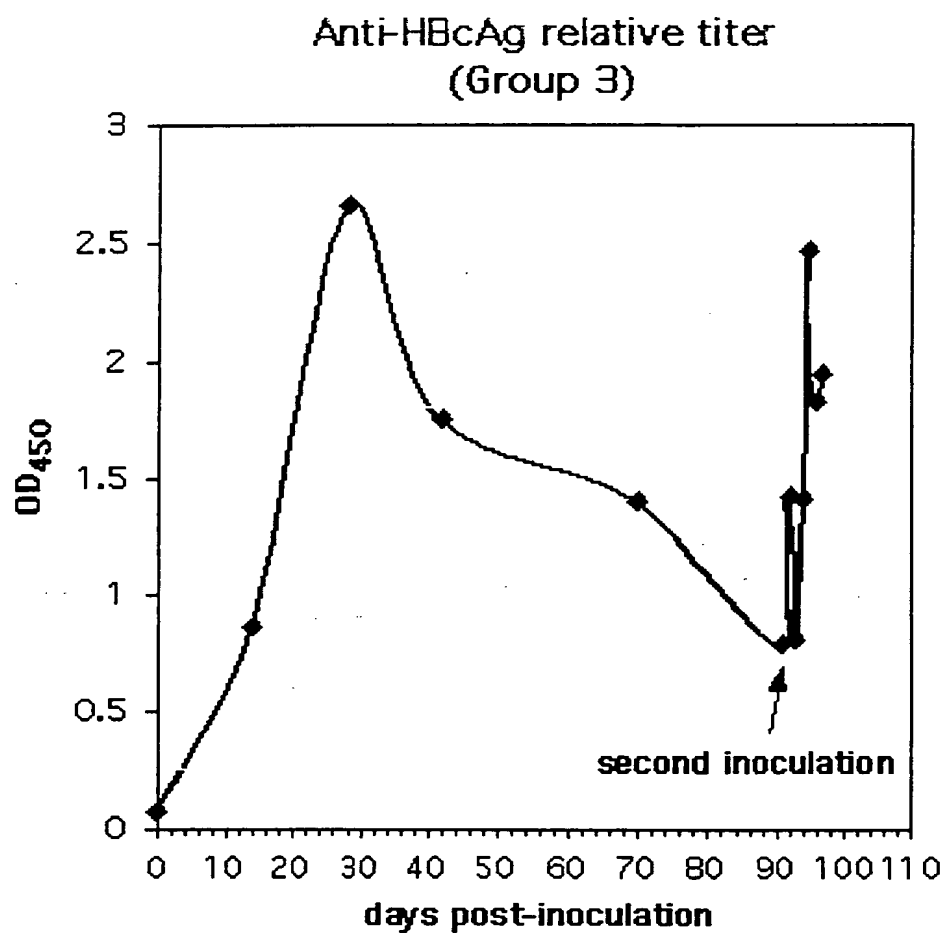
**FIGURE 10A**

Anti-HBsAg relative titer  
(Group 2)



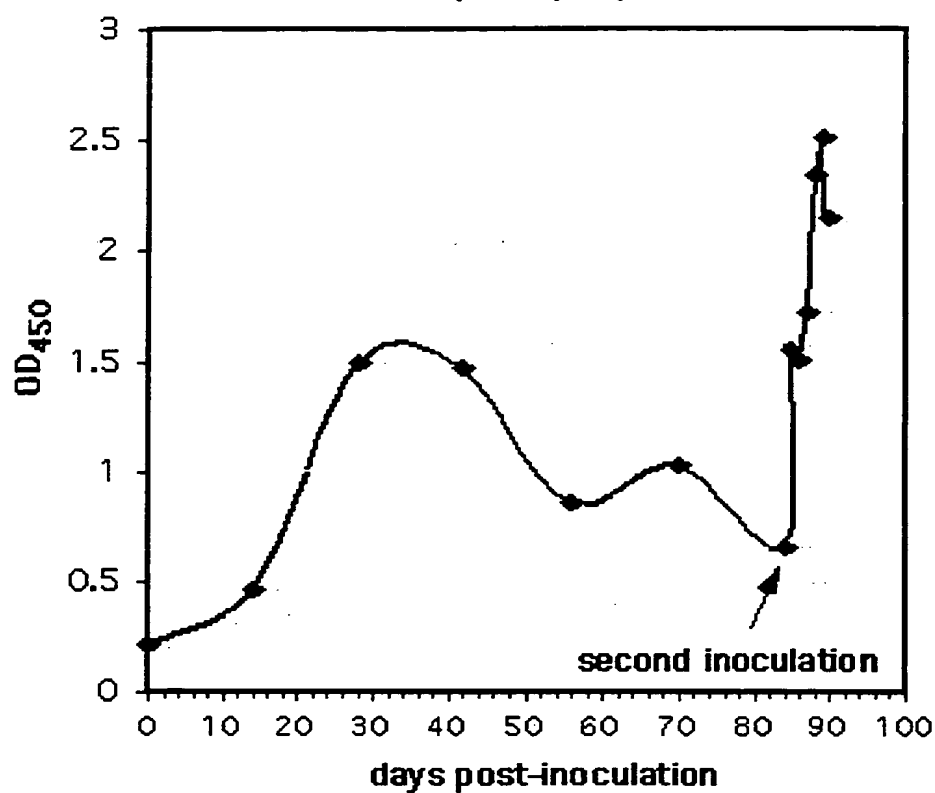
**FIGURE 10B**

2014-10-15 09:00:00



**FIGURE 11A**

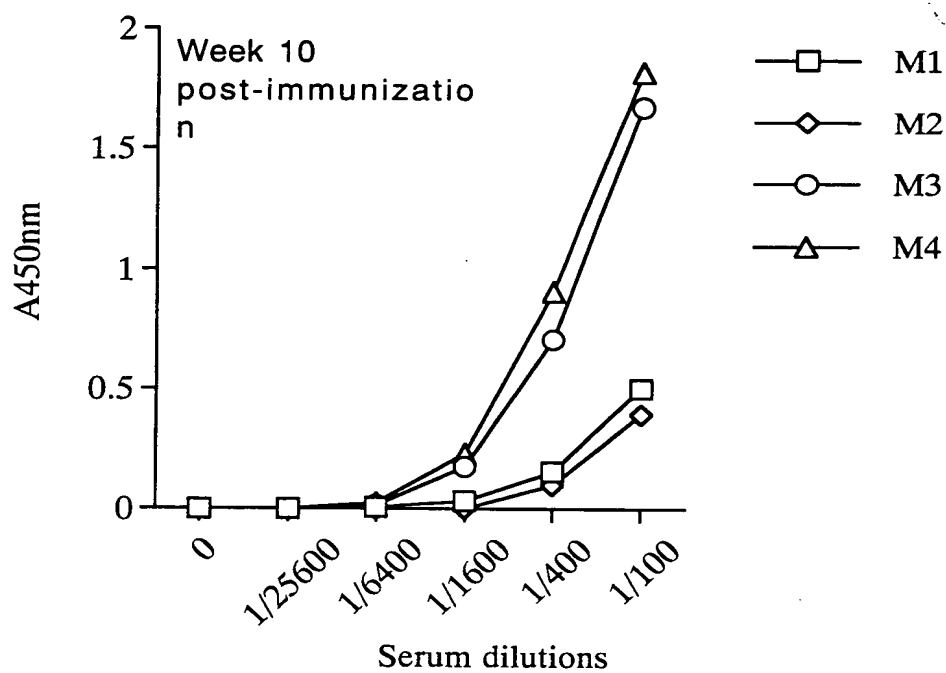
Anti-HBcAg relative titer  
(Group 4)



**FIGURE 11B**

FIGURE 12

A.



B.

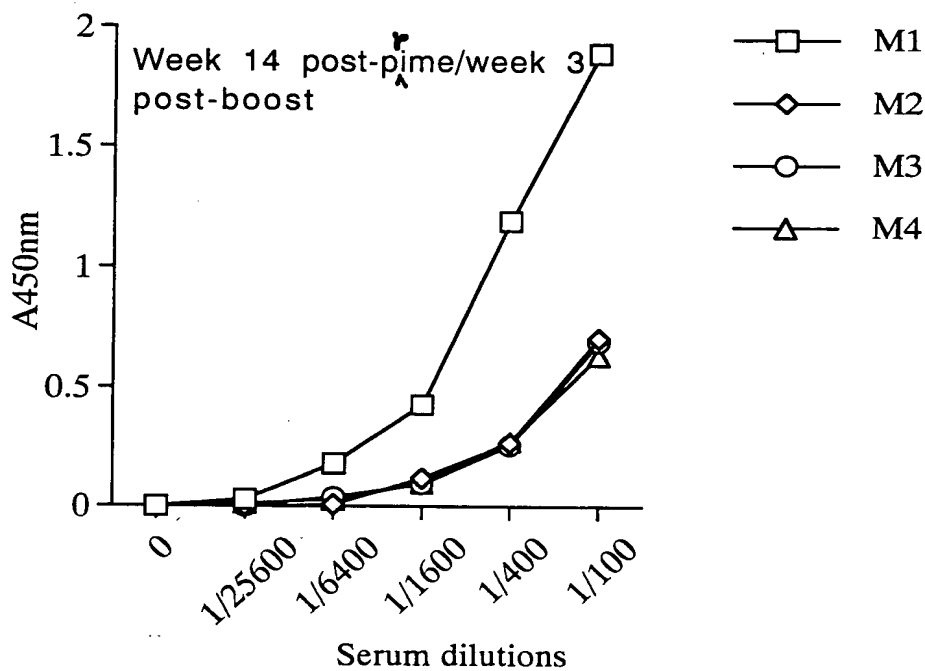
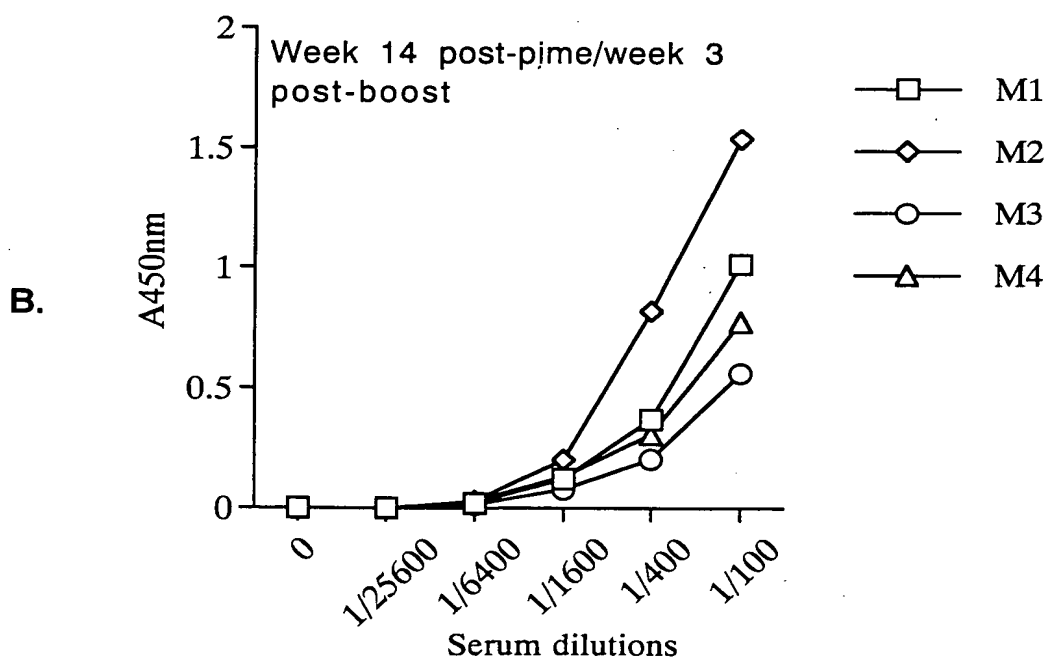
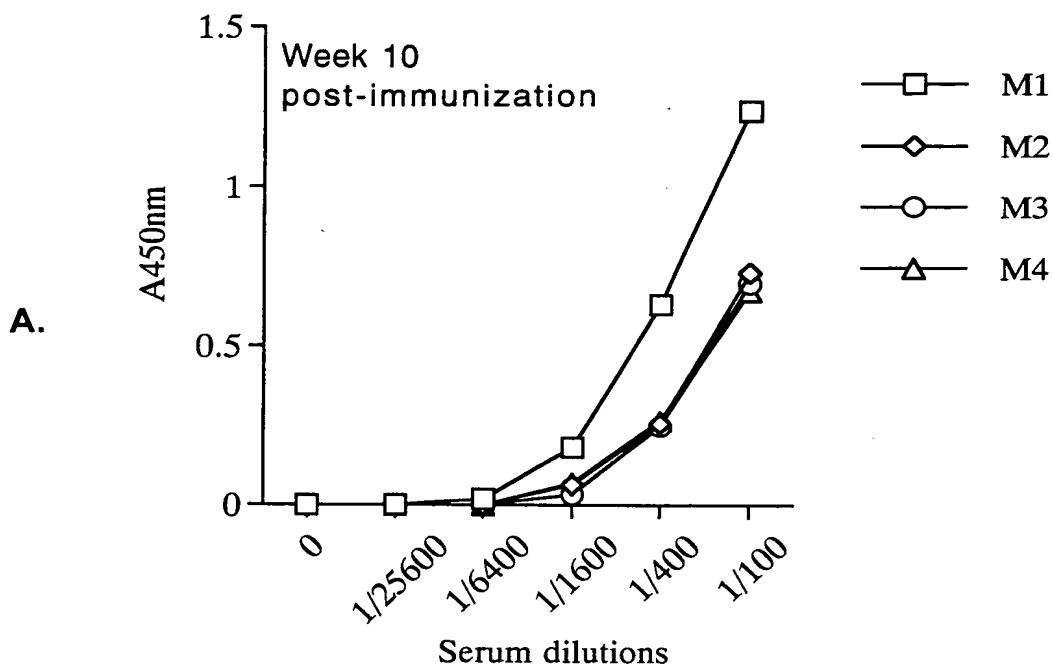




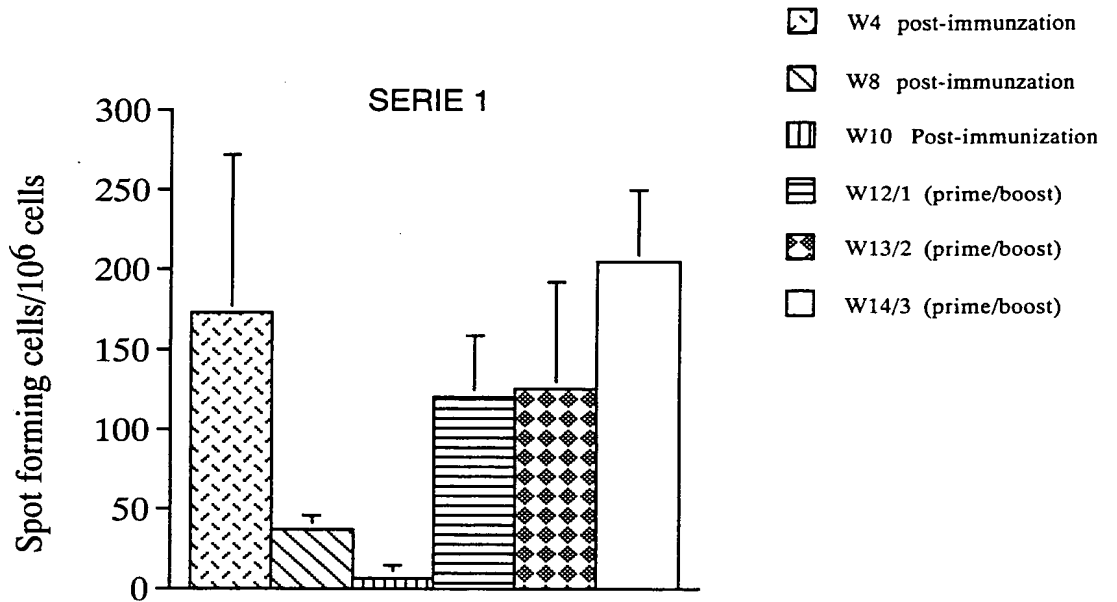
FIGURE 13



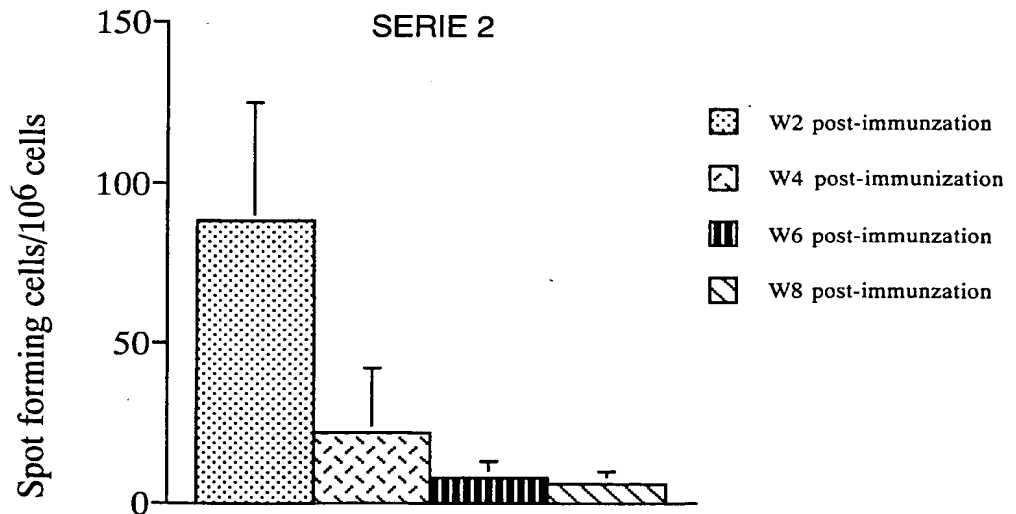
**FIGURE 14**

Gag-specific IFN $\gamma$  secreting splenic cells  
after immunization of mice with Ad(3C,  
Gag, Env)

**A.**



**B.**



**FIGURE 15**

L23: ELISPOT for IFN $\gamma$  secretion: Serie1 spleen cells from mice at week W13/2 (post-prime/boost).

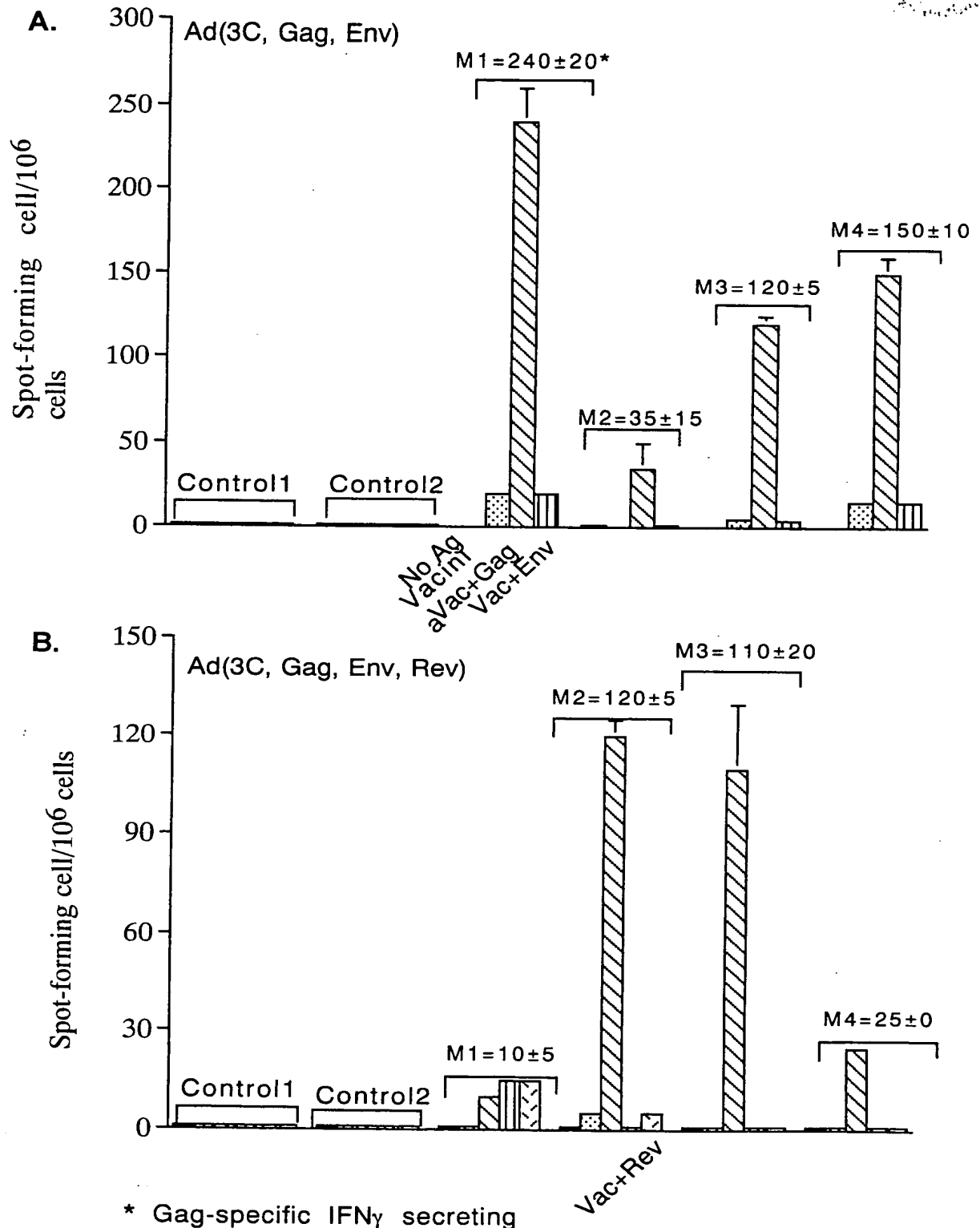
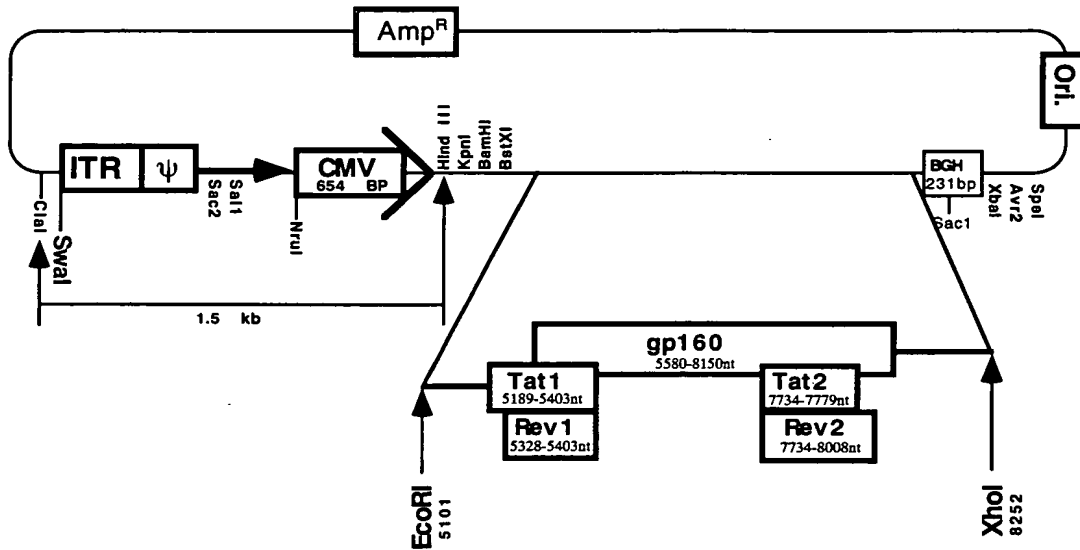


FIGURE 16 Ad-E.T.R/IL2 (from BH10 strain)

A. pLAd-E.T.R



B. pRAd.ORF6-IL2

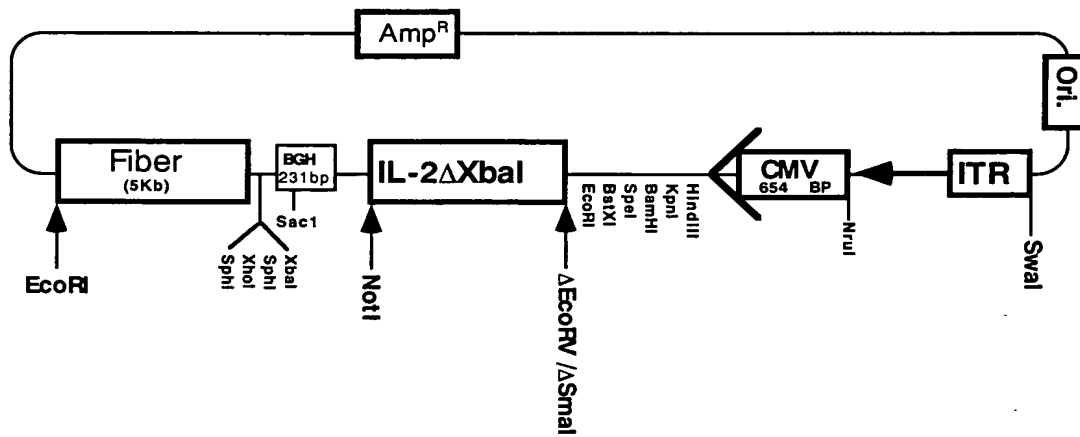
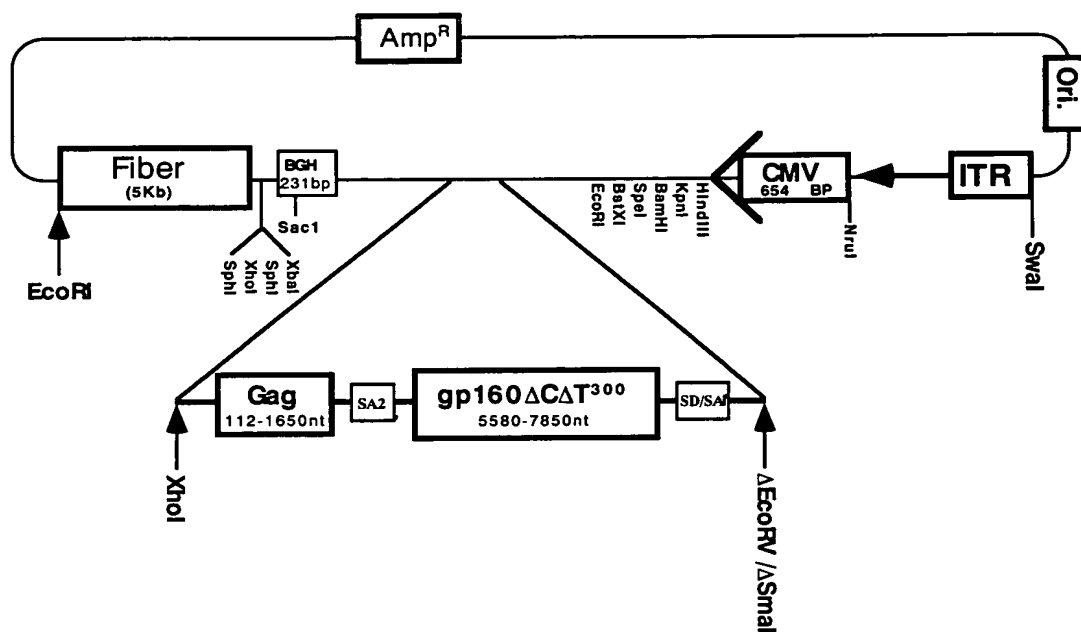
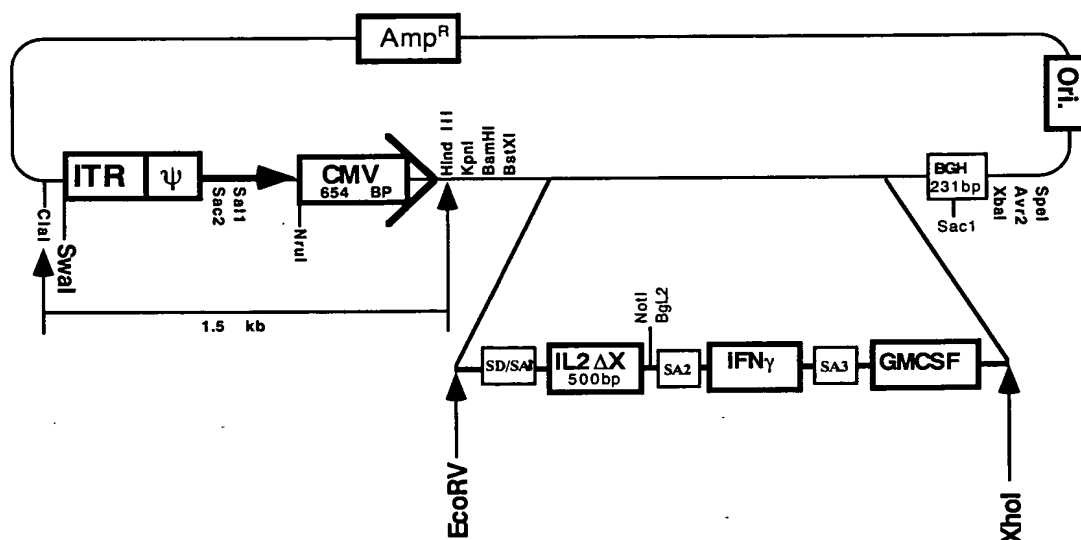


FIGURE 17 Ad-3C/E<sup>m</sup>ΔCΔT<sup>300</sup>-G (from BH10 strain)

A. pRAAd.ORF6-E<sup>m</sup>ΔCΔT<sup>300</sup>-G



B. pLAd-3C



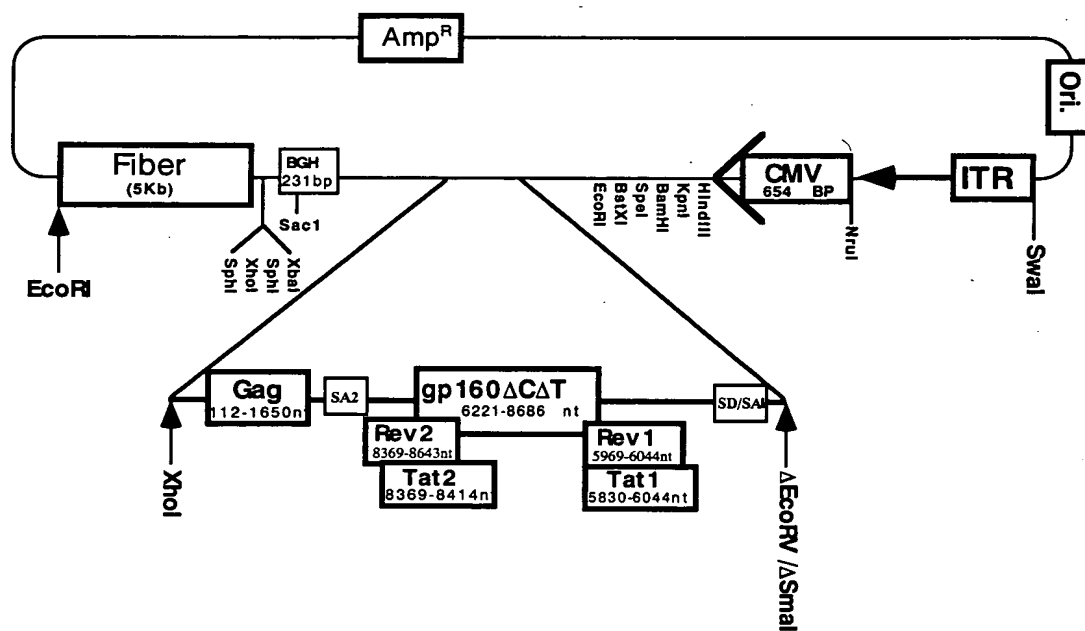
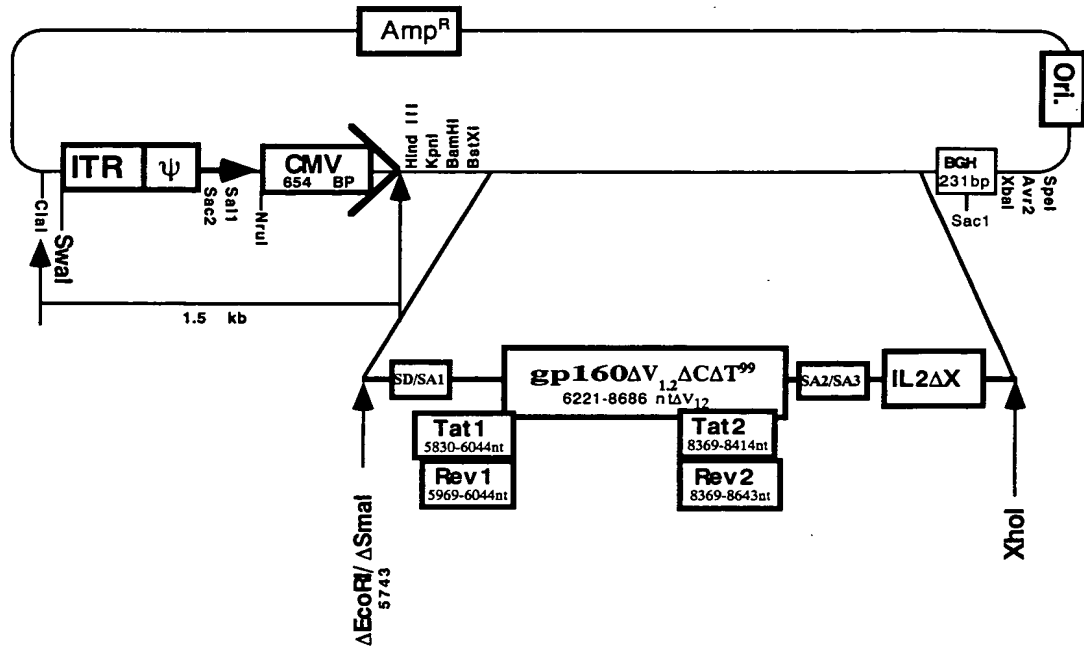
[illegible]

FIGURE 19

A. pLAd-E<sup>m</sup> $\Delta V_{1,2}\Delta CA\Delta T$ .T.R-IL2



B. pRAAd. ORF6-G.IL2

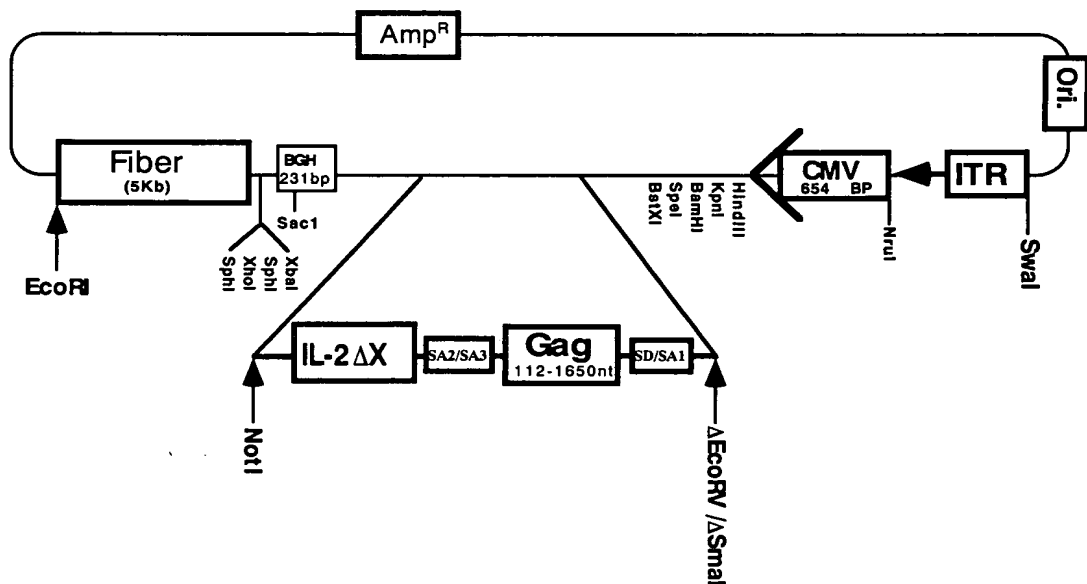


FIGURE 20

pLAd-ETRN

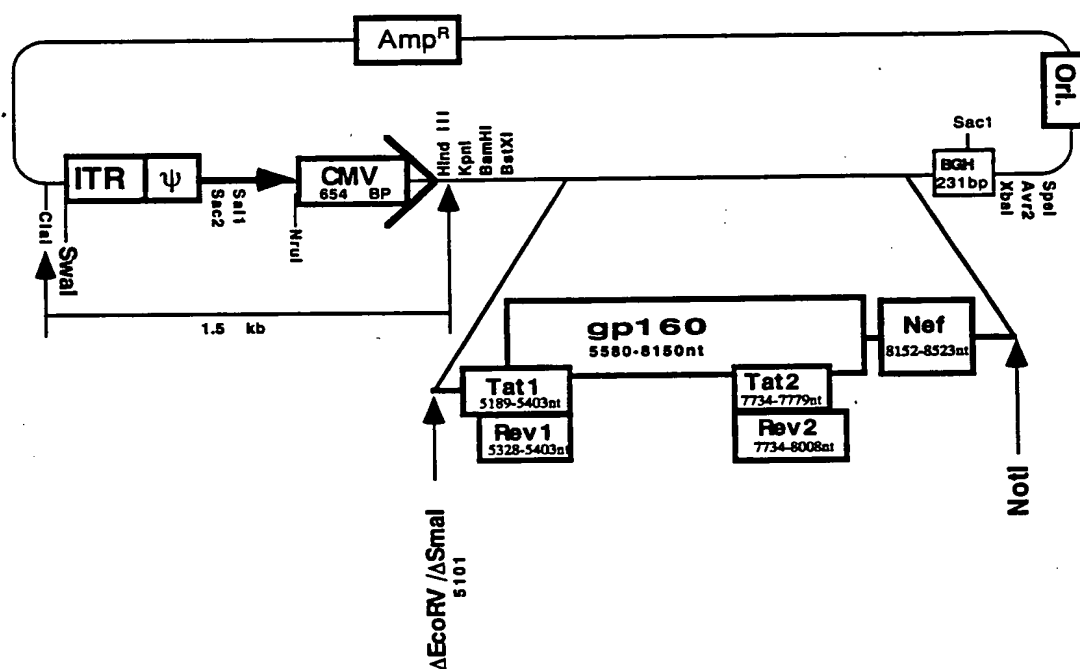




FIGURE 21

pLAd-E<sup>m</sup>ΔC.N

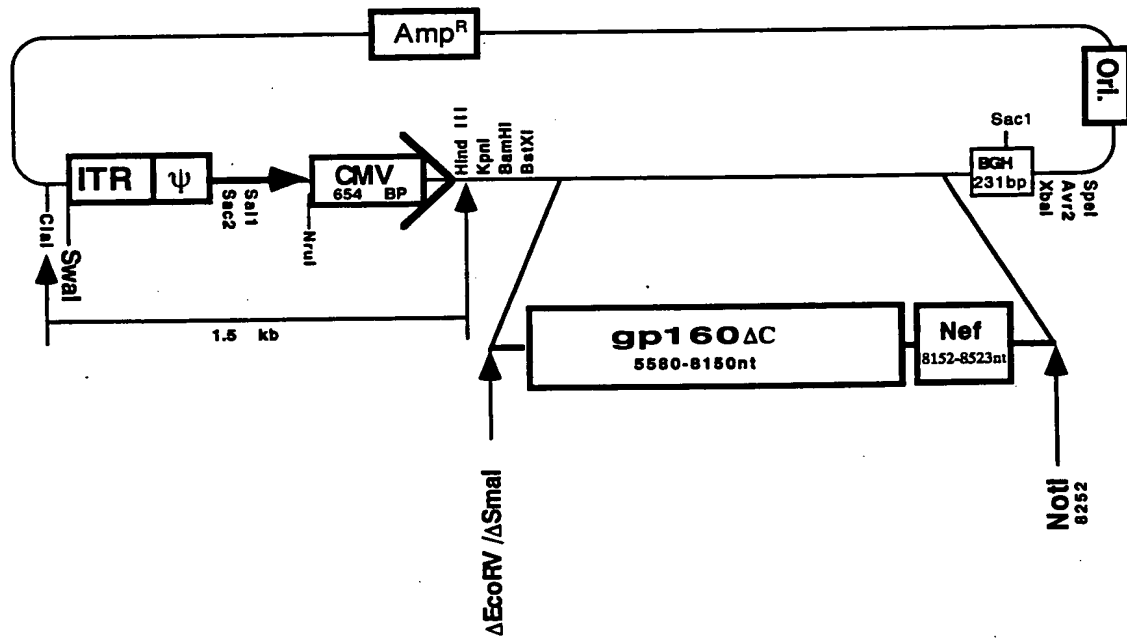
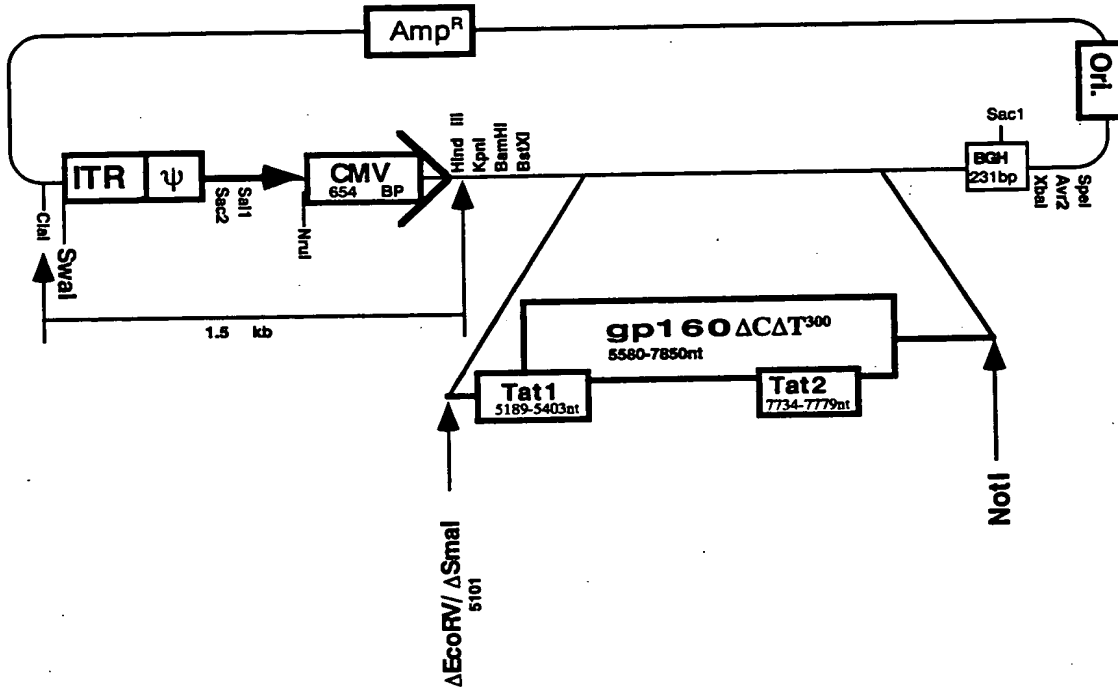
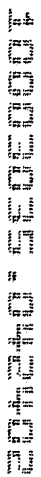
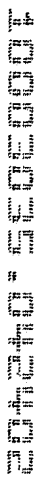


FIGURE 22

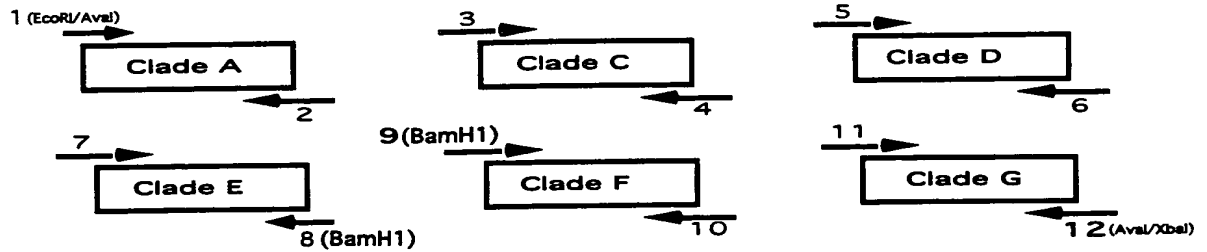
pLAd-E<sup>wt</sup>ΔCAT<sup>300</sup>.T



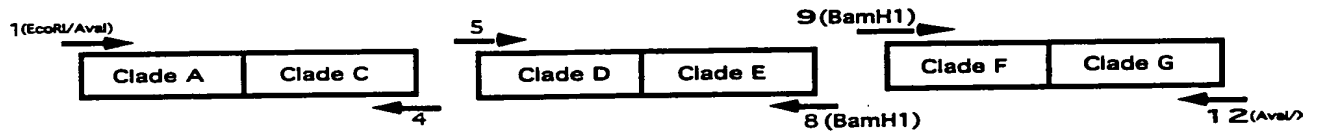
[illegible][illegible]

# FIGURE 24

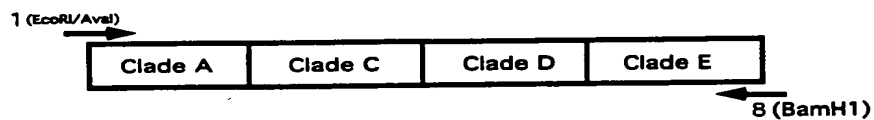
## Step 1. Amplification of each individual clade A-G



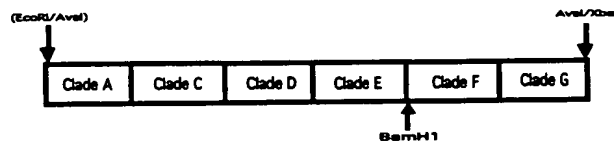
## Step 2. Amplification of every two Clades AC, DE, FG



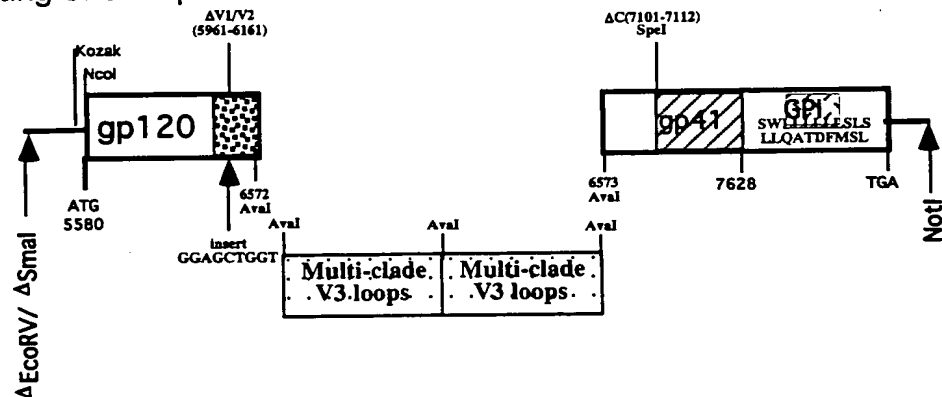
## Step 3. Amplification of Clades ACDE



## Step 4. Cloning the multi-clades into pSP73 vector



## Step 5. Generating of a duplicated multi-clades



20140505 0440

FIGURE 25

pLAd-E<sup>m</sup>.V3

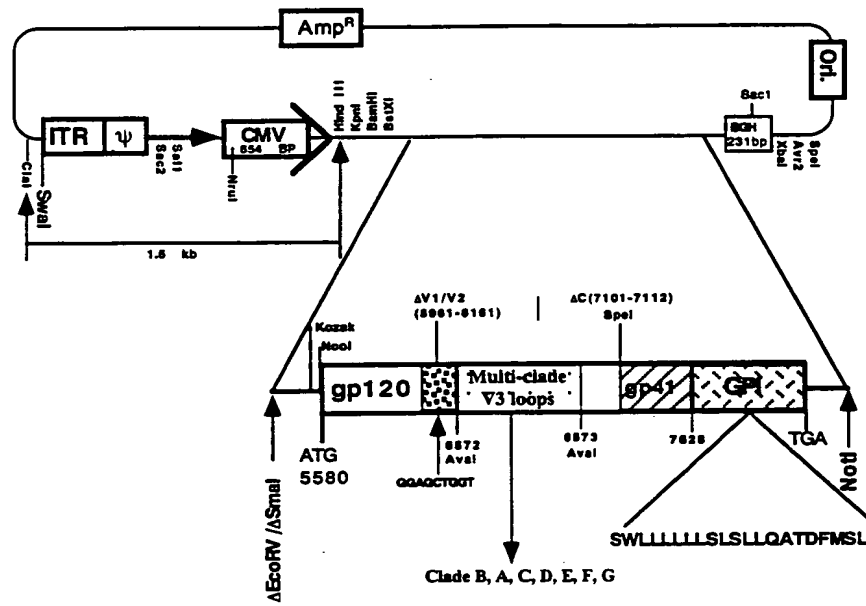


FIGURE 26

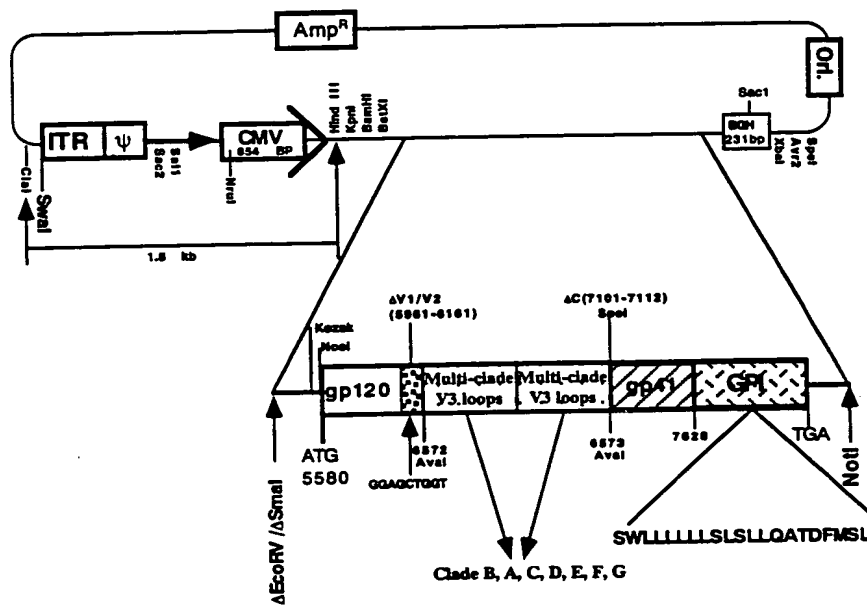
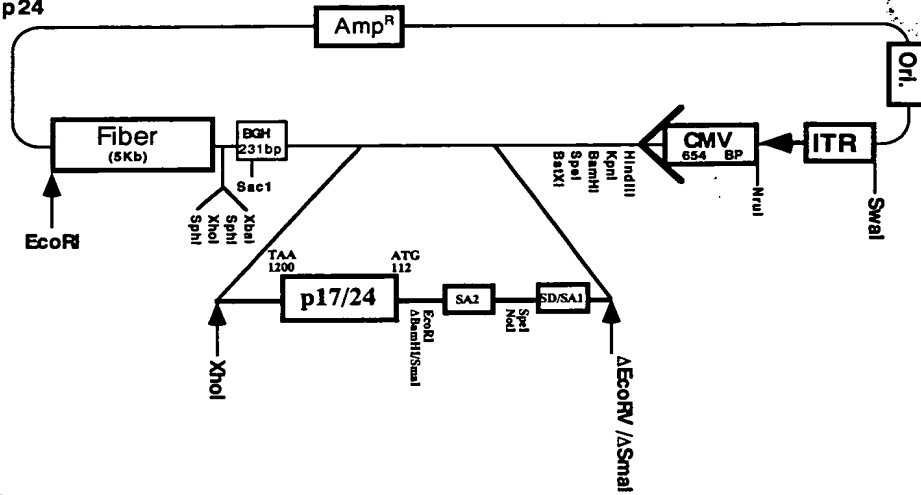
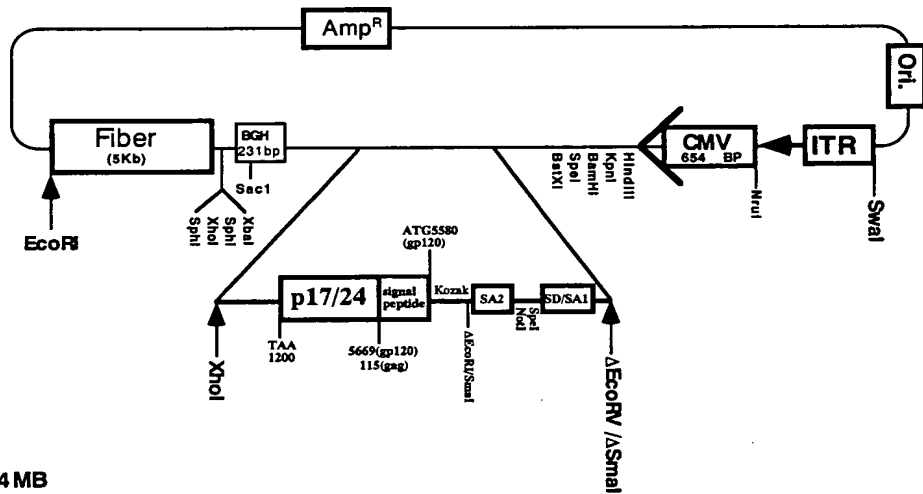


FIGURE 27

A. pRAd.ORF6-p17/p24



B. pRAd.ORF6-p17/24sec



C. pRAd.ORF6-p17/24MB

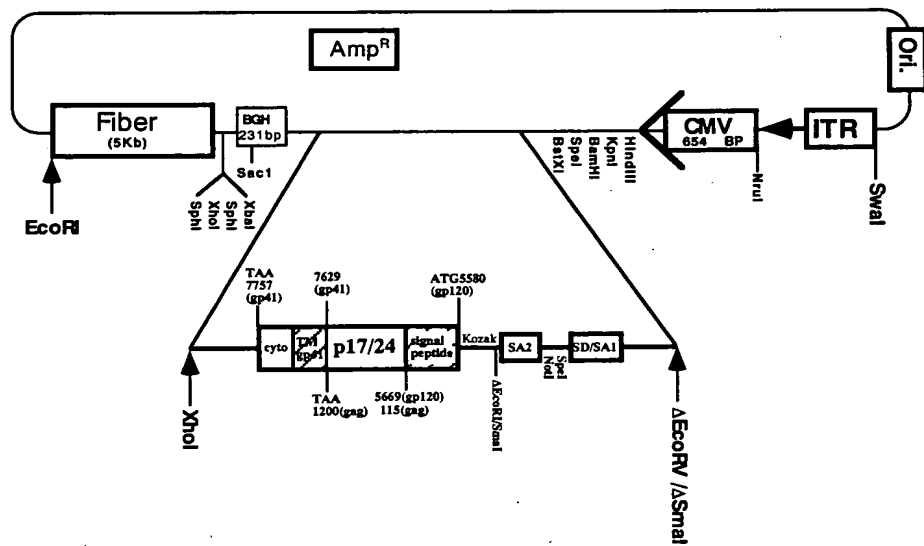
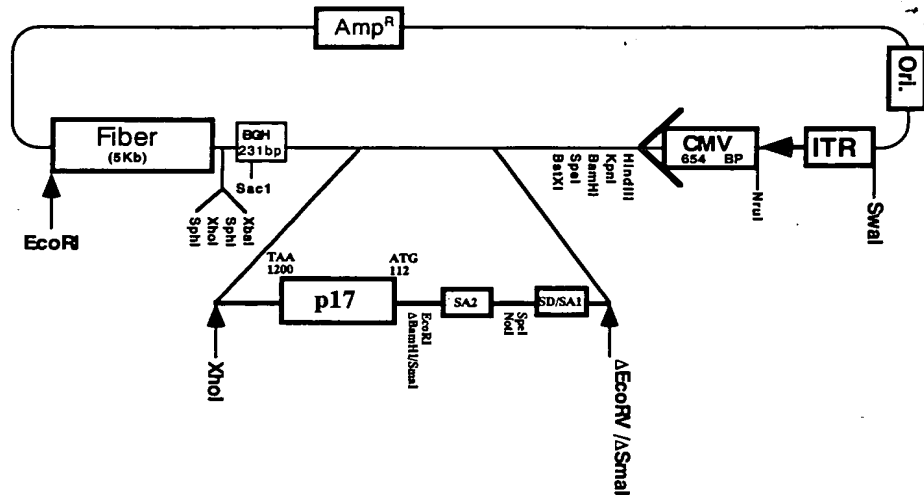
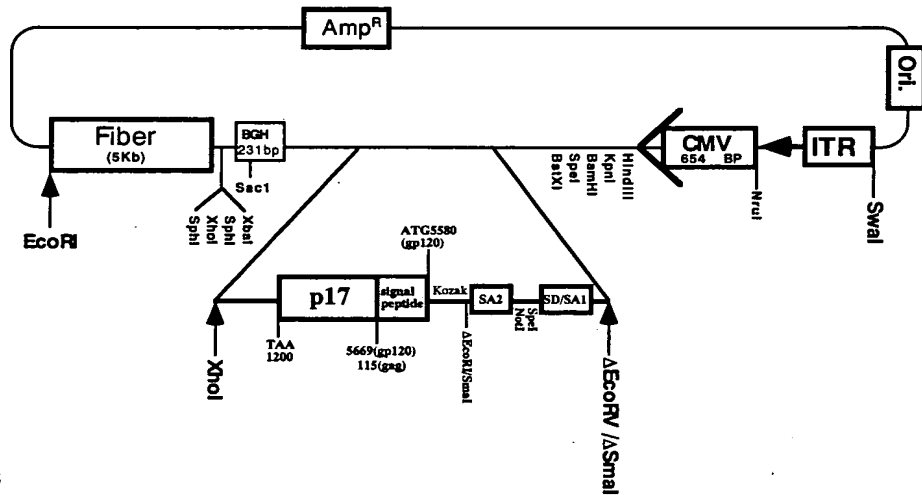


FIGURE 28

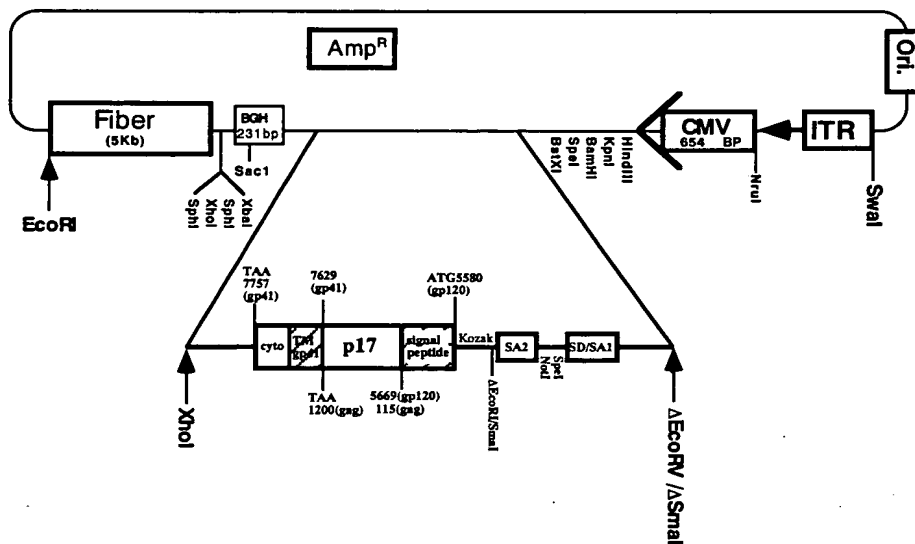
A. pRAAd.ORF6-p17



B. pRAAd.ORF6-p17sec



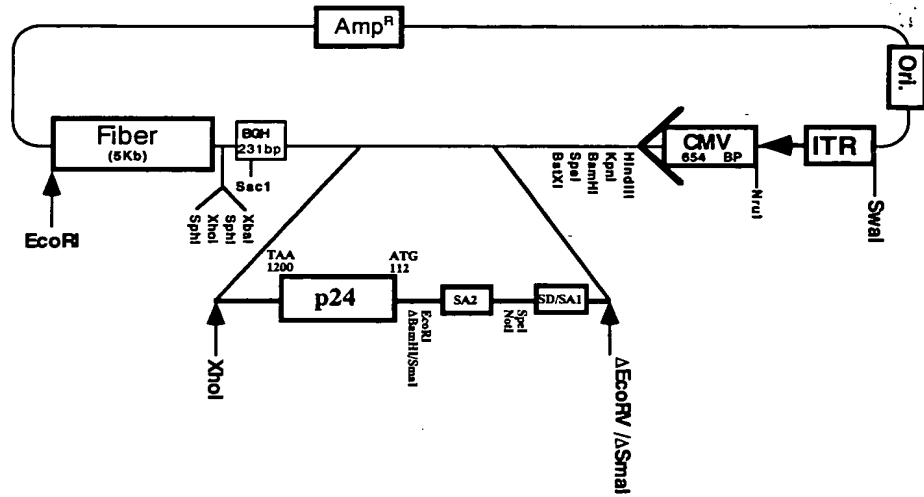
C. pRAAd.ORF6-p17 MB



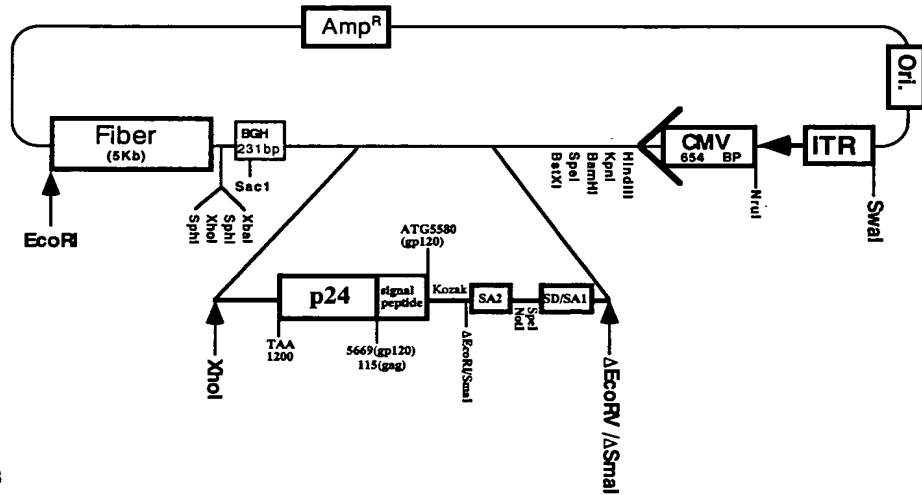


# FIGURE 29

## A. pRAAd.ORF6-p24



## B. pRAAd.ORF6-p24 sec



## C. pRAAd.ORF6-p24 MB

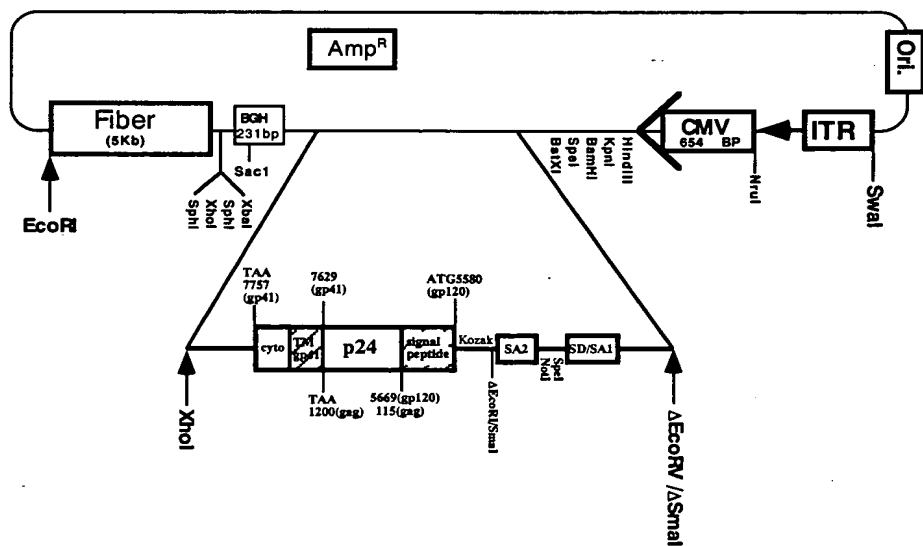
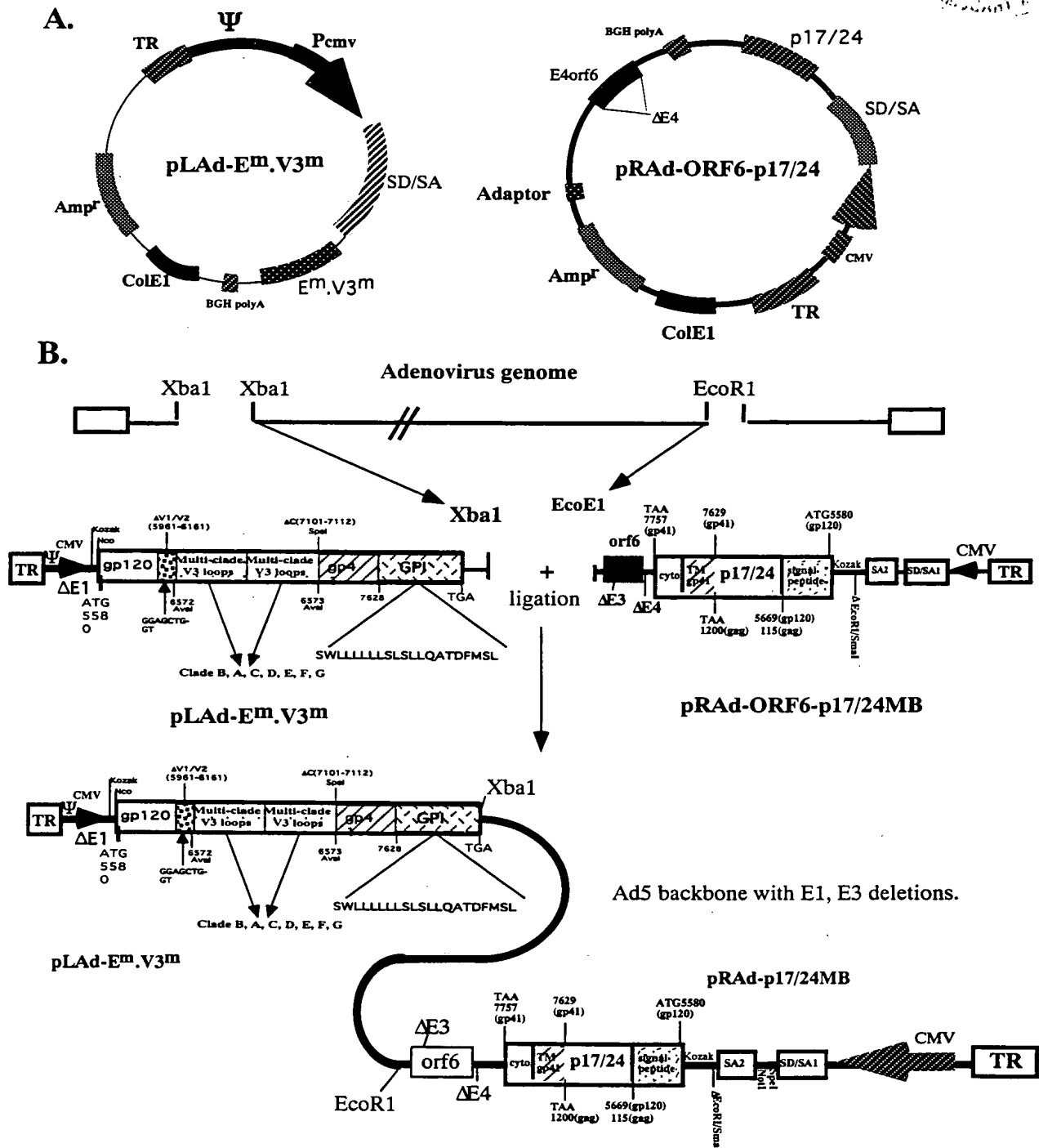


FIGURE 30 Adenoviral construct of Ad-E<sup>m</sup>.V3<sup>m</sup>/p17/24MB



**FIGURE 31 Adenoviral construct of Ad-Em.V3m/p17MB**

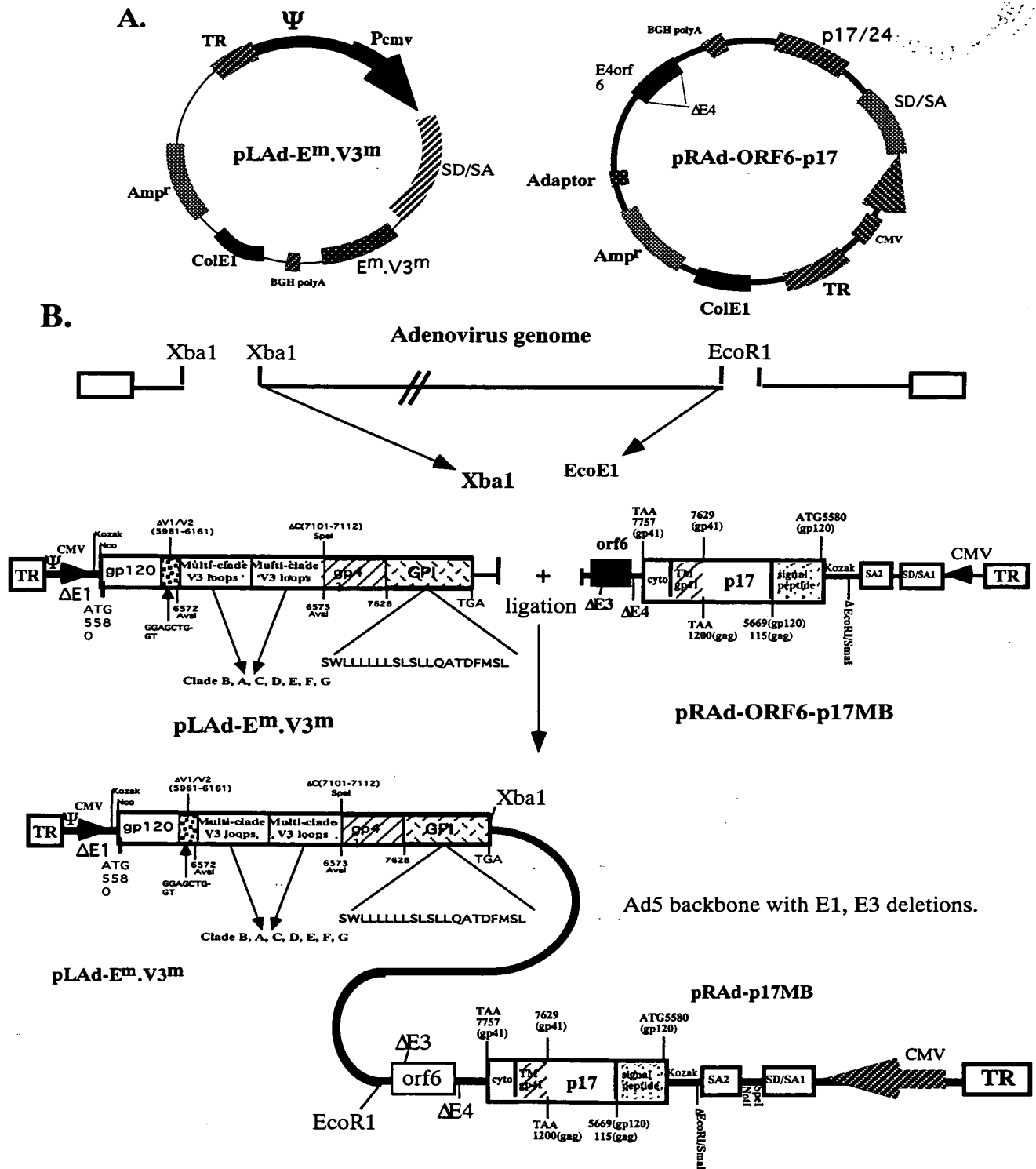


FIGURE 32 Adenoviral construct of Ad-E<sup>m</sup>.V3<sup>m</sup>/p24MB

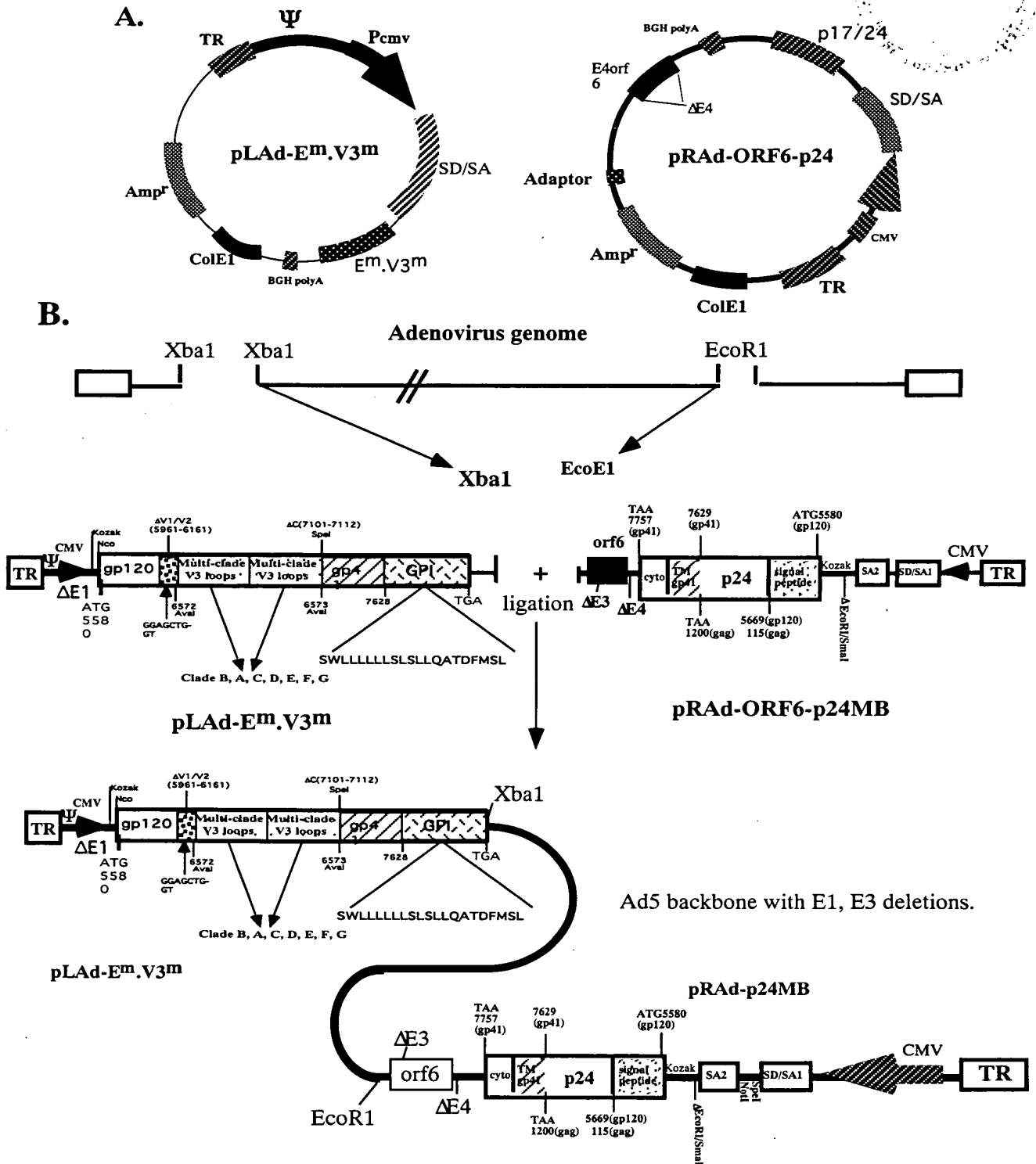


FIGURE 33

pLAd-E<sup>Δ</sup>CAΔT<sup>300</sup>.V3<sup>Δ</sup>.T.

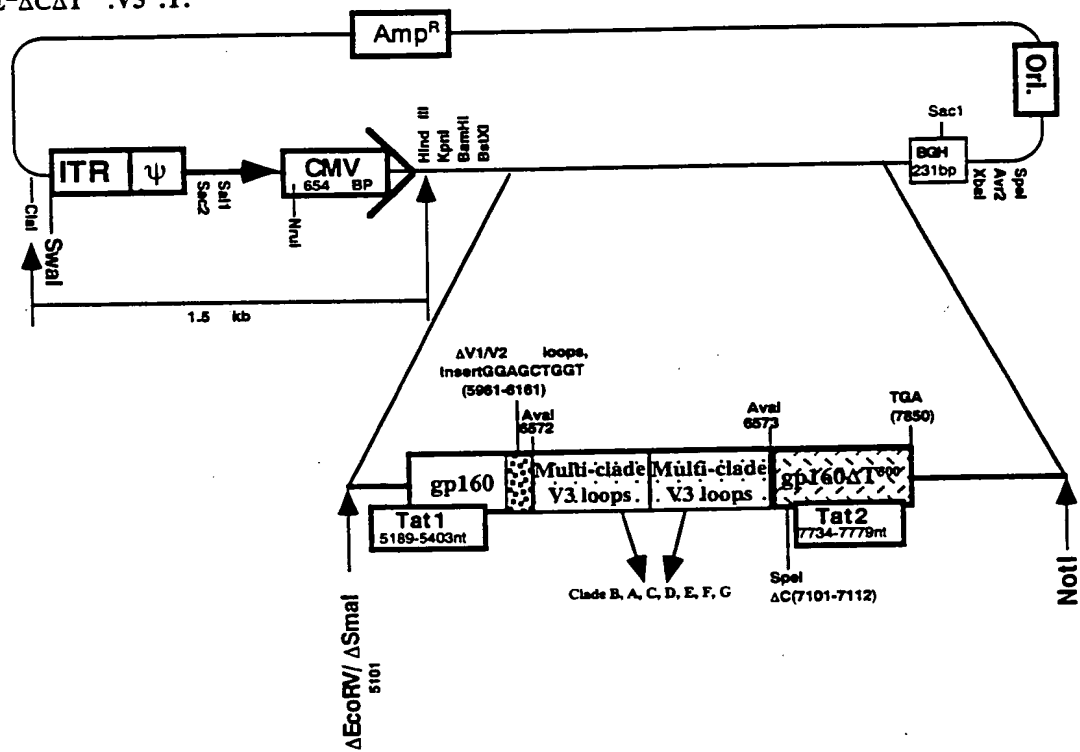
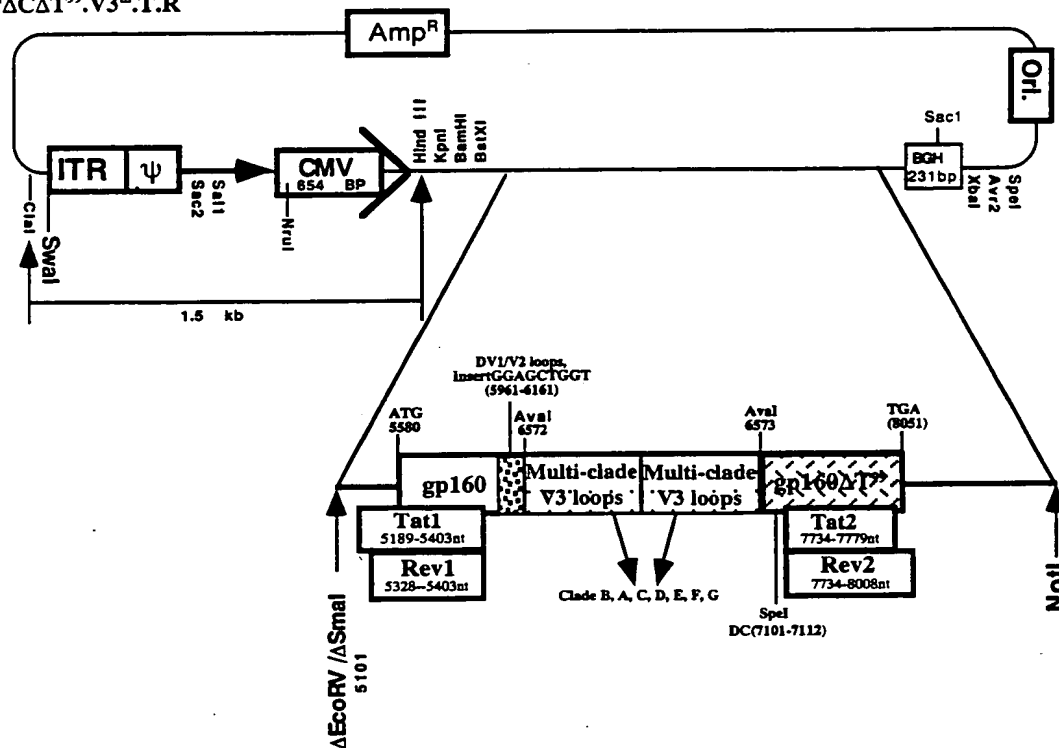


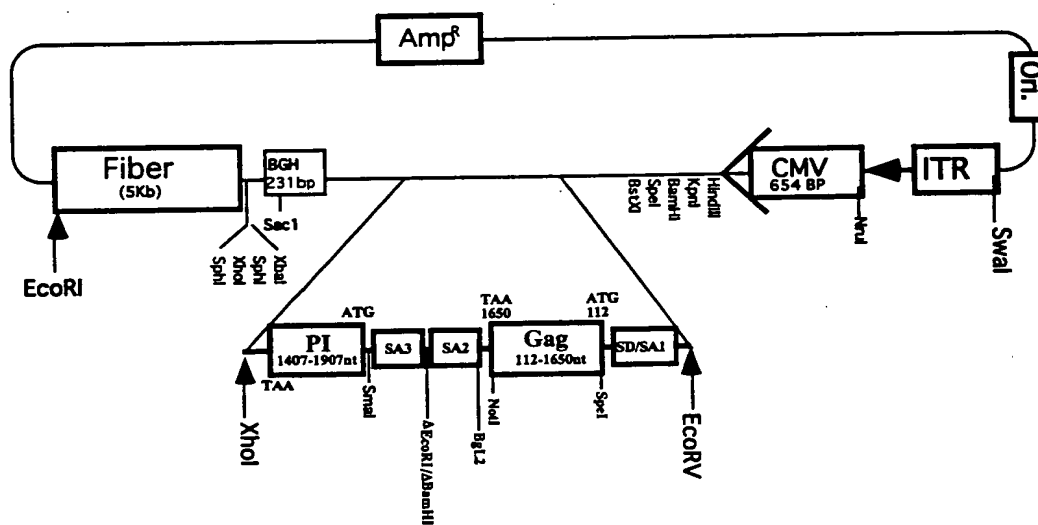
FIGURE 34

pLAd-E<sup>Δ</sup>CAΔT<sup>99</sup>.V3<sup>Δ</sup>.T.R



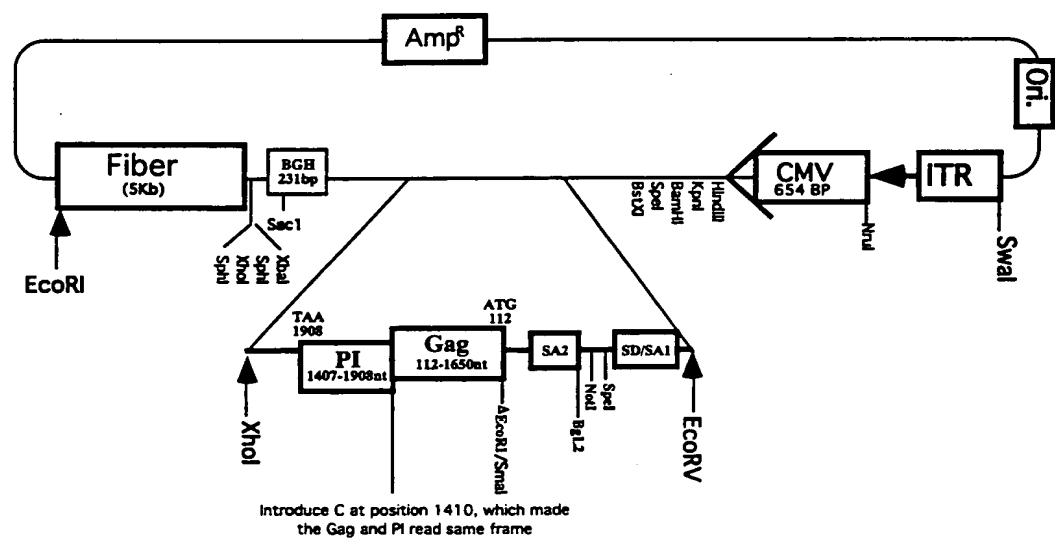
pRad. ORF6-G.PI

FIGURE 35



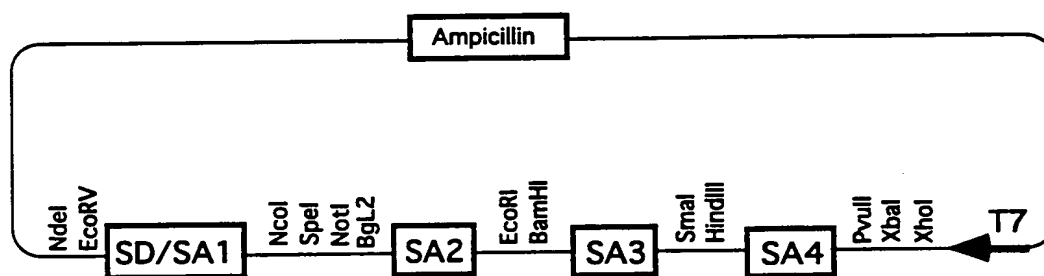
pRad. ORF6-G-PI

FIGURE 36





**FIGURE 37**  
**SD/SA1.2.3 vector**



Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100
1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	

Gaattctgcaacaactgctgtttatccatcttcagaattgggtgtcgacat

XhoI

[illegible]
$$\Delta X_{baI} \quad (cta \rightarrow ctt)$$

ggaagtgcataaatttagctcaaagcaaaaactttcacttaagacccagggga  
cttaatcagcaatatcaacgtaatagttctggaactaaagggatctgaaac  
aacattcatgtgtgaatatgctgatgagacagcaaccattgtagaatttct  
gaacagatggattaccttttgtcaaagcatcatctcaacactaacttga

## FIGURE 40

### DNA Sequence of Env<sup>m</sup>ΔCAT<sup>300</sup> (HIV strain BH10) [SEQ ID NO: 16]:

**Gaattcg****ccaccatggg**gagtgaaggagaaatatcagcacttgtggagatg

EcoRI Kozak NcoI

ggggtggagatggggcaccatgctccttgggatgttgatgatctgtagtgtacagaaaaa  
ttgtgggtcacagtctattatggggtacctgtgtggaagggaagcaaccacctctat  
gtgcatcagatgctaaagcatatgatacagagggtacataatgtttgggccacacatgcctg  
tgtacccacagaccccaacccacaagaagtagtattggtaaattgtgacagaaaaatttaac  
atgtggaaaaatgacatggtagaacagatgcatgaggatataatcagtttatgggatcaaa  
gcctaaagccatgtgtaaaattaacccactctgtgttagtttaaagtgcactgatttgaa  
gaatgatactaataaccaatagtagtagcgggagaatgataatggagaaaggagagataaaa  
aactgctctttcaatatcagcacaagcataagaggtaagggtgcagaaagaatatgcatttt  
ttataaaacttgatataataaccaatagataatgatactaccagctatacgttgacaagt  
taacacctcagtcattacacaggcctgtccaaagggtatcctttgagccaattcccatacat  
tattgtgccccggctggttttgcgattctaaaaatgtaataataagacggttcaatggaacag  
gacctgtacaaatgtcagcacagtacaatgtacacatggaattaggccagtagtatcaac  
tcaactgctgttaaattggcagtcctggcagaagaagaggtagtaattagatctgccaat  
acagacaatgctaaaaccataatagtacagctgaaccaatctgtagaaattaattgtacaa  
gacccaacaacaatacaagaaaaagtatccgtatccagagaggaccagggagagcattt  
gttacaataggaaaaataggaaatatgagacaagcacattgtaacattagtagagcaaaat  
aataacacttttaaacagatagatagcaaatgaagagaacaatttggaaataataaaacaa  
taatctttaagcagtcctcaggaggggaccagaaattgtaacgcacagttttaattgtgg  
aggggaatttttctactgttaattcaacacaactgtttaatagtacttggtttaatagtact  
tggagtactaaagggtcaaataacactgaagggaagtgcacaatcacccctcccatgcagaa  
taaaacaaattataaacatgtgtggcaggaagtaggaaaagcaatgtatgccctcccatcag  
tggacaaattagatgttcatcaaataattacagggtgctattaacaagagatgggtggaat  
agcaacaatgagtcagagatcttcagacctggaggaggagatagagggacaattggagaa  
gtgaattatataaatataaagtagtaaaaattgaaccattaggagtagcaccaccaaaggc  
aaagagaagagtggtgcagACTAGTgcagtggaataggagctt

ΔCleavage site (**agagaaaaaaga**) → SpeI

tgttccttgggttcttgggagcagcaggaagcactatgggcgagcgtcaatgacgctgac  
ggtacaggccagacaattattgtctggtatagtgcagcagcagaacaatttgcctgagggt  
attgaggcgcaacagcatctgttgcaactcacagtcctggggcatcaagcagctccaggcaa  
gaatcctggctgtggaaagatacctaaggatcaacagctcctggggatttgggggttgctc  
tggaaaactcatttgcaccactgctgtgccttgggaatgctagttggagtaataaatctctg  
gaacagatttggaaataacatgacctggatggagtgggacagagaaattaacaattacacaa  
gcttaatacactccttaattgaagaatcgcaaaaccagcaagaaaagaatgaacaagaatt  
attggaattagataaatgggcaagtttgtggaattgggttaacataacaaattggctgtgg  
tatataaaattattcataatgatagtaggaggttggtaggtttaagaatagtttttgctg  
tactttctgtagtgaatagagtttaggcagggtatattcaccattatcgtttcagacccact  
cccaatcccagggggaccgcagagcccgaagggaatagaagaagaagggtggagagagagac  
agagacagatccatttcgatttagtgaacggatccttagcacttatctggttaa

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[illegible]

accctcgtcacataa

[illegible]

M	G	A	R	R	A	S	V	L	S	G	G	E	L	D	K	R	W	E	K
I	R	L	R	E	P	E	G	K	K	E	Y	R	Q	C	E	H	I	V	E
A	S	S	S	L	K	N	R	L	I	N	T	Q	E	G	S	E	S	I	K
S	I	S	I	D	Q	P	V	A	T	I	R	V	K	Q	S	V	Q	I	V
D	P	S	P	L	S	E	N	A	I	P	K	A	F	Q	H	A	A	A	F
L	A	P	A	K	G	N	M	F	M	N	A	V	Q	V	T	E	V	Q	M
H	G	I	I	A	I	T	E	T	I	E	G	G	E	E	P	G	A	P	V
A	P	I	E	P	V	P	P	E	S	Q	Y	R	I	Q	W	T	P	Q	I
P	E	E	A	N	S	R	V	G	G	E	T	I	W	E	I	G	M	P	P
I	S	A	N	E	P	F	N	E	Y	S	D	L	E	S	D	A	H	N	K
E	P	N	E	L	M	Q	I	Q	K	T	W	A	E	H	P	V	A	P	Q
V	F	G	E	G	E	C	Q	R	T	C	L	K	G	T	R	A	K	P	A
R	T	G	E	G	F	A	C	M	S	S	V	C	P	F	M	M	C	P	E
E	I	P	E	G	T	R	K	N	Q	Q	K	R	A	K	C	A	A	P	V
C	P	E	P	P	E	S	F	W	S	P	K	N	E	G	L	L	L	Q	I
L	P	P	E	G	P	D	P	T	R	R	F	P	T	T	P	A	I	E	K
N	D			S		S	*		Q		Y		S	L	S	S	R	W	E

## FIGURE 42

DNA Sequence of E<sup>m</sup>ΔCAT<sup>99</sup>.T.R (HIV strain pNL4-3) [SEQ ID NO: 19]:

Gaattctgcaacaactgctgtttatccatttcagaattgggtgtcgacatag

EcoRI

cagaataggcgttactcgacagaggagagcaagaaatggagccagtagatcctagactagagccctggaagca  
tccaggaagtgcgcctaaaactgcttgtaccaattgctattgtaaaaagtgttgctttcattgccaagttgt  
ttcatgacaaaagccttaggcattctcctatggcaggaagaagcggagacagcgacgaaagagctcatcagaaca  
gtcagactcatcaagcttctctatcaaagcagtaagtagtacatgtaatgcaacctataatagtagcaatagt  
agcatttagtagtagcaataataatagcaatagttgtgtggtccatagtaatcatagaatataggaaaatatta  
agacaaaagaaaaatagacagggttaattgatagactaatagaaagagcagaagacagtggcaatgagagtgaag  
gagaagtatcagcacttgtggagatgggggtgaaatggggcaccatgctccttgggatattgatgatctgta  
gtgctacagaaaaattgtgggtcacagtctattatggggtacctgtgtggaaggaaagcaaccaccactctatt  
ttgtgcatcagatgctaaagcatatgatacagagggtacataatgtttgggcccacacatgcctgtgtaccaca  
gaccccaacccacaagaagtagtattggtaaatgtgacagaaaaattttaacatgtgaaaaatgacatggtag  
aacagatgcatgaggatataatcagtttatgggatcaaaagcctaaagccatgtgtaaaatttaacccactctg  
tgtagtttaaaagtgcactgatttgaagaatgatactaataccaatagtagtagcgggagaatgataatggag  
aaaggagagataaaaaactgctctttcaatatcagcacaagcataagagataaagggtgcagaaagaatatgcat  
tcttttataaaacttgatatagtagtaaccaatagataataacca  
gctatagggttgataagttgtaacacctcagtcattacacaggcctgtccaaaggtatcctttgagccaattcc  
catacattattgtgccccggctgggttttgcgattctaaaatgtaataataagacgttcaatggaacaggacca  
tgtacaaatgtcagcacagtacaatgtacacatggaatcaggccagtagtatcaactcaactgctgttaaattg  
gcagtctagcagaagaagatgtagtaattagatctgccaaatttcacagacaatgctaaaaccataatagtaca  
gctgaacacatctgtagaattaattgtacaagacccaacaacaatacaagaaaaagtatccgtatccagagg  
ggaccaggagagcatttgttacaataggaaaaataggaaatagagacaagcacattgtaacattagtagag  
caaatgggaatgccactttaaaacagatagctagcaaatgaagagaacaatttggaaataataaaacaataat  
ctttaagcaatcctcaggaggggacccagaaattgtaacgcacagttttaattgtggaggggaattttctac  
tgtaatcaacacaactgtttaatagtagtcttgggttaattagtagtctggagtagtgaagggtcaaataacactg  
aaggaagtgcacacatcacactcccatgcagaataaaacaatttataaacatgtggcaggaagttaggaaaagc  
aatgtatgccccctcccatcagtggaacaaattagatgttcatacaaatattactgggctgctatttaacaagagat  
gggtggaataacaacaatgggtccgagatcttcagacctggaggagcgatagtaggggacaattggagaagtg  
aattatataaatataaagtagtaaaaaattgaaccattaggagtagcaccacccaaggcaagagaagagtggg  
gcagACTAGTgcagtggaataggagctttgttccttg

ΔCleavage site (agagaaaaaga) → SpeI

ggttcttgggagcagcaggaagcactatgggctgcacgtcaatgacgctgacgggtacaggccagacaattatt  
gtctgatatagtgacgagcagaacaatttgcctgagggtcattgaggcgcaacagcatctgttgcaactcaca  
gtctggggcatcaaacagctccaggcaagaatcctggctgtggaaagatacctaaggatcaacagctcctgg  
ggatttgggggtgctctggaataactcatttgcaccactgctgtgccttggaaatgctagttggagtaataaatc  
tctggaacagatttgggaataacatgacctggatggagtgaggacagagaaattaacaattacacaagcttaata  
cactccttaattgaagaatcgaaaaccagcaagaaaagaatgaacaagaattattggaattagataaatggg  
caagtttgtggaattgggttaacataacaaattggctgtggtatataaaattattcataatgatagtaggagg  
cttggttaggtttaagaatagtttttgcctgactttctatagtgaaatagagttaggcagggtattcaccatta  
tcgtttcagacccacctcccaatcccagggggacccgacaggcccgaagggaatagaagaagaagggtggagaga  
gagacagagacagatccattcgattagtgaaaggatccttagcacttatctgggacgatctgcggagcctgtg  
cctcttcagctaccaccgcttgagagacttactcttgattgtaacgaggattgtggaacttctgggacgcagg  
gggtgggaagccctcaaatattgtggaatctcctacagtagtattggagtcaggaaactaaagaatagtgtgtta  
acttgctcaatgccacagccatagcagtagctgagtaa

## FIGURE 43

DNA Sequence of E<sup>m</sup>ΔV<sub>12</sub>ΔCΔT<sup>99</sup>.T.R (Strain pNL4-3) [SEQ ID NO: 20]:

Gaattctgcaacaactgctgtttatccatttcagaattgggtgtcgacatag  
EcoRI

Cagaataggcgttactcgacagaggagagcaagaaatggagccagtagatcctagactagagccctggaagca  
tccaggaagtgcgctctaaaactgcttgtaccaattgctattgtaaaaagtgttgctttcattgccaagttgt  
ttcatgacaaaagccttaggcatctcctatggcaggaagaagcggagacagcgacgaagagctcatcagaaca  
gtcagactcatcaagcttctctatcaaagcagtaagtagtacatgtaatgcaacctataatagtagcaatagt  
agcattagtagtagcaataataatagcaatagttgtgtgggtccatagtaatcatagaatataggaaaatatta  
agacaaaagaaaaatagacagggttaattgatagactaatagaaagagcagaagacagtggaatgagagtgaag  
gagaagtatcagcacttgtggagatgggggtggaatggggcaccatgctccttgggatattgatgatctgtgta  
gtgtacagaaaaattgtgggtcacagtctattatggggtagctgtgtggaaggaagcaaccaccactctatt  
ttgtgcatcagatgctaaagcatatgatacagaggtacataatgtttgggccacacatgcctgtgtaccaca  
gaccccaacccacaagaagtagtatttggtaaatgtgacagaaaattttaacatgtggaaaaatgacatggtag  
aacagatgcatgaggatataatcagtttatgggatcaaagcctaaagccatgtgtaaaattaacccactctg  
tggt ΔV1 and V2 loops

Agttgtaacacctcagtcattacacaggcctgtccaaaggtatcctttgagccaattcccatacattattgtg  
ccccggctgggttttgcgattctaaaaatgtaataataagacggttcaatggaacaggaccatgtacaaatgtcag  
cacagtacaatgtacacatggaatcaggccagtagtatcaactcaactgctgttaaattggcagctctagcagaa  
gaagatgtagtaattagatctgccaaatttcacagacaatgctaaaaccataatgtacagctgaacacatctg  
tagaaattaattgtacaagacccaacaacaatacaagaaaaagtatccgtatccagaggggaccagggagagc  
atgtgttacaataggaaaaataggaaatatgagacaagcacattgtaacattagtagagcaaaatggaatgcc  
actttaaaacagatagctagcaaatgaagagaacaatttggaaataataaaaacaataatcctttaagcaatcct  
caggaggggaccagaaattgtaacgcacagttttaaattgtggaggggaatttttctactgtaattcaacaca  
actgttttaattagtagtacttggagtactgaagggtcaaataacactgaaggaagtgcacaca  
atcacactcccatgcagaataaaaacaatttataaacatgtggcaggaagtaggaaaagcaatgtatgccctc  
ccatcagtggaacaaattagatgttcatcaaatattactgggctgctattaacaagagatgggtggaataacaa  
caatgggtccgagatcttcagacctggaggaggcgatatgagggacaattggagaagtgaattatataaatat  
aaagtagtaaaaaattgaaccattaggagtagcaccaccaaagagaagagtggtgcagACTAGTgcag  
tggaataggagctttgttccttgggttcttgggagca

ΔCleavage site (agagaaaaaaga) → SpeI

gcaggaagcactatgggctgcacgtcaatgacgctgacggtacaggccagacaattattgtctgatatagtgc  
agcagcagaacaatttgcaggggtattgaggcgcaacagcatctgttgcaactcacagtctggggcatcaa  
acagctccaggcaagaatcctggctgtggaaagatacctaaaggatcaacagctcctggggatttgggggtgc  
tctggaaaactcatttgcaccactgctgtgccttggaaatgctagttggagtaataaatctctggaacagattt  
ggaataacatgacctggatggagtgggacagagaaaattaacaattacacaagcttaatacactccttaattga  
agaatcgcaaaaccagcaagaaaagaatgaacaagaattattggaattagataaatgggcaagtttgtggaat  
tgggttaacataacaaattggctgtggtatataaaattattcataatgatagtaggaggttggtaggttttaa  
gaatagtttttgcgtactttctatagtgataggttaggcagggatattcaccattatcgtttcagaccca  
cctcccaatcccagggggacccgcagggcccgaaggaatagaagaagaaggtggagagagagacagagacaga  
tccattcgatttagtaacggatccttagcacttatctgggacgatctgcggagcctgtgcctcttcagctacc  
accgcttgagagacttactcttgattgtaacgaggattgtggaacttctgggacgcaggggggtgggaagccct  
caaatattgggtggaatctcctacagtagtggagtcaggaactaaagaatagtgctgttaacttgctcaatgcc  
acagccatagcagtagctgagtaa



## FIGURE 44

### DNA Sequence of Env<sup>m</sup>ΔC.T.R.N (Strain BH10) [SEQ ID NO: 21]:

Gaattctgcaacaactgctgtttatccattttcagaattgggtgtcgacat

EcoRI

agcagaataggcggttactcgacagaggagagcaagaaatggagccagtagatcctagactagagccctgga  
agcatccaggaagtgcagcctaaaactgcttgtaccaattgctattgtaaaaagtgttgccttcattgccaa  
gtttgtttcataacaaaagccttaggcattctcctatggcaggaagaagcggagacagcgacgaagacctcc  
tcaaggcagtcagactcatcaagtttctctatcaaagcagtaagtgtacatgtaattgcaacctatacaaa  
tagcaatagtagcatttagtagtagcaataataatagcaatagttgtgtggtccatagtaatcatagaatat  
aggaaaaatattaagacaaaagaaaaatagacaggttaattgatagactaatagaaagagcagaagacagtgg  
caatgagagtgaaggagaaatcagcacttgtggagatgggggtggagatggggcaccatgctccttggg  
atgttgatgatctgtagtgtacagaaaaattgtgggtcacagtctattatgggggtacctgtgtggaagga  
agcaaccaccactctatttgtgcatcagatgctaagcatatgatacagaggtacataatgtttgggcca  
cacatgctgtgtgtacccacagaccccaaccacaagaagtgtatttggtaaatgtgacagaaaaatttaac  
atgtggaaaaatgacatggttagaacagatgcatgaggatataatcagtttatgggatcaaagcctaaagcc  
atgtgtaaaattaaacccactctgtgttagtttaaagtgcactgatttgaagaatgatactaataccaata  
gtagtagcgggagaatgataatggagaaaggagagataaaaaactgctctttcaatatcagcacaagcata  
agaggttaaggtgcagaaagaatatgcattttttataaaacttgatataataccaatagataatgtactac  
cagctatacgttgacaagttgtaacacctcagtcattacacaggcctgtccaaaggtatcctttgagccaa  
ttcccatacattattgtgccccggctgtgttgcgattctaaaatgtaataataagacgttcaatggaaca  
ggaccatgtacaaatgtcagcacagtacaatgtacacatggaattaggccagtagtatcaactcaactgct  
gttaaatggcagctctggcagaagaagaggttagtaatttagatctgccaatttcacagacaatgctaaaacca  
taatagtacagctgaaccaatctgtagaatttaattgtacaagacccaacaacaatacaagaaaaagtac  
cgtatccagagaggaccaggagagcatttgttacaataggaaaaataggaaatatgagacaagcacattg  
taacattagtagagcaaaaatggaataacacttttaaacagatagatagcaaatgaagaacaatttgga  
ataataaaaacaataatctttaagcagtcctcaggaggggacccagaaattgtaacgcacagttttaattgt  
ggaggggaatttttctactgtaattcaacacaactgtttaatagtagtacttggtttaatagtagtactggagtag  
taaagggtcaaataacactgaaggaaagtgcacaatcaccctcccatgcagaataaaaacaaattataaaca  
tgtggcaggaagtaggaaaaagcaatgtatgcccctcccatcagtggaacaaatagatgttcatcaaatatt  
acagggtgctattaaacaagagatgggtggtatagcaacaatgagtcagatcttcagacctggagagg  
agatagagggacaattggagaagtgaattatataaataaaagtagtaaaaaattgaaccattaggagtag  
cacccaaggaagcagaagagaagagtggtgcagACTAGTgcagtggaataggagctttgttccttgggttc  
t

ΔCleave site (agagaaaaaga)→SpeI

tgggagcagcaggaagcactatgggcgcagcgtcaatgacgctgacggtacaggccagacaattattgtct  
ggtatagtgcagcagcagaacaatttgcctgagggctattgaggcgcaacagcatctgttgcaactcacagt  
ctggggcatcaagcagctccaggcaagaatcctggctgtggaaagatacctaaaggatcaacagctcctgg  
ggatttgggttgcctctggaaaactcatttgcaccactgctgtgccttggaatgctagttggagtaataaa  
tctctggaacagatttgaataacatgacctggatggagtgaggacagagaaattaacaattacacaagctt  
aatacactccttaattgaagaatcgcaaaaccagcaagaaaagaatgaacaagaattattggaattagata  
aatgggcaagtttgtggaattgggttaacataacaaattggctgtggtatataaaattattcataatgata  
gtaggaggcttggtaggtttaagaatagtttttgcctgactttctgtagtgaatagagttaggcaggata  
ttcaccattatcgtttcagacccacctccaatcccagggggacccgacaggcccgaaaggaatagaagaag  
aaggtggagagagagacagagacagatccattcgattagtgaacggatccttagcacttatctgggacgat  
ctgaggagcctgtgcctcttcagctaccaccgcttgagagacttactcttgattgtaacgaggatttggga  
acttctgggacgcaggggggtgggaagccctcaaatattgggtggaatctcctacagtattggagtcaggagc  
taaagaatagtgtgttagcttgcctcaatgccacagctatagcagtagctgaggggacagataggggtata  
gaagtgtacaaggagcttatagagctattcgccacatacctagaagaataagacagggcttggaaggat  
tttgcataagatgggtggcaagtggtcaaaaagtagtgtgtggttggtggatggcctgctgtaagggaagaatg  
agacgagctgagccagcagcagatgggggtgggagcagcatctcgagacctagaaaaacatggagcaatcac  
aagtagcaacacagcagctaacaatgctgattgtgcctggctagaagcacaagaggaggagaggtgggtt  
ttccagtcacacctcaggtacctttaagaccaatgacttacaaggcagctgtagatcttagccacttttta  
aaagaaaaggggggactggaagggttaattcactcccaacgaagacaagatatccttgatctgtggatcta  
ccacacacaaggctacttcctgattag

[illegible]

EcoRI      Kozak      NcoI

$\Delta$ Cleavage site(agagaaaaaaga)→SpeI

ΔCleaveage site (taggggaaagggg) 75bp

agcaggaagcactatggcgcgacgctcaatgacgctgacgggtacaggccagacaattattgtctgggtatag  
tcgacgagcagacaacaatttctgaggggctattgaggcgcaacagcatctgttgcaactcacagctctggggc  
atcaagcagctccaggcaagaatcctggctgtggaaagatacctaaaggatcaacagctcctggggatttg  
gggttgctctggaaaactcatttgaccactgctgtgccttggaatgctagtgtggagtaataaaatctctgg  
aacagatttggaataacatgacctggatggagtgggacagagaaaattacaattacacagcttaatacac  
tccttaattgaagaatcgcaaaaccgacgaagaaaagaatgaacaagaattatttggaaattagataaaatgggc  
aagtttgtggaattgggtttacaataacaaattggctgtggatatataaaattatttcataatgatagtaggag  
gcttggtaggtttaagaatagtttttgcgtgactttctgtagtgaatagagttaggcagggatattcacca  
ttatcgtttcagacccacctcccaatcccaggggacccgacaggcccgaaggaaatagaagaagaagggtgg  
agagagagacagagacagatccattcgattagtgaacggatccttagcacttatctgggacgatctcgga  
gcctgtgcctcttcagctaccaccgcttgagagacttactcttgattgtaacgaggattgtggaactctctg  
ggacgcaggggggtgggaagccctcaaatatttgggtggaattctctacagatttggagtcaggagctaaagaa  
tagtgctgttagtctgactaattgccacagctatagcagtagctgaggggacagatagggttatagaagttag  
tacaaggagcttatagagctattcgccacatacctagaagaataagacagggcttggaaaggattttgcta  
taagatgggtggcaagtggcaaaaagtagtgtggttggatggcctgctgtaagggaagaagaatgagacgag  
ctgagccagcagcagatggggtgggagcagcatctcgagacctagaaaaacatggagcaatcacaagttagc  
aacacagcagctaacaattgctgattgtgcctggctagaagcacaagaggaggaggtgggttttccagt  
cacacctcaggtacctttaagaaactgacttacaaggcagctgtagatcttagccactttttaaagaaa  
aggggggactggaagggtcaattcactcccaacgaagacaagatatccttgatctgtggatctaccacaca  
caaggctacttcctgattag

## FIGURE 46

### DNA Sequence of E<sup>m</sup>ΔCAT<sup>300</sup>.T (BH10) [SEQ ID NO: 23]:

Gaattctgcaacaactgctgtttatccattttcagaattgggtgtcgacat  
EcoRI

Agcagaataggcggttactcgacagaggagagcaagaaatggagccagtaga

Tat 1

tcctagactagagccctggaagcatccaggaagtgcagcctaaaactgctgtaccaattgctattgtaaaa  
agtgttgctttcattgccaagtttgtttcataacaaaagccttaggcattcctatggcaggaagaagcgg  
agacagcgacgaagacctcctcaaggcagtcagactcatcaagtttctctatcaaagcagtaagtagtaca  
tgtaatgcaacctatacaaatagcaatagtagcattagtagtagcaataataatagcaatagttgtgtggt  
ccatagtaatcatagaatataggaaaatattaaagacaaaagaaaaatagacaggttaattgatagactaata  
gaaagagcagaagacagtggaatgagagtggaaggagaaatatcagcacttgtggagatgggggtggagat  
ggggcaccatgctccttgggatgttgatgactgttagtgctacagaaaaattgtgggtcacagtcattat  
gggtacctaattgtttgggcccacacatgcctgtgtacccacagaccccaacccacaagaagtagtattggtaa  
atgtgacagaaaaattttaacatgtggaaaaatgacatggtagaacagatgcatgaggatataatcagttta  
tgggatcaaagcctaaagccatgtgtaaaaattaaccccactctgtgttagtttaaaagtgcactgatttgaa  
gaatgataactaataccaatagtagtagcgggagaatgataatggagaaaggagagataaaaaactgctctt  
tcaatatcagcacaagcataagaggttaaggtgcagaaagaatatgcattttttataaaacttgatataata  
ccaatagataatgatactaccagctatacgttgacaagttgtaaacacctcagtcattacacaggcctgtcc  
aaaggtatcctttgagccaattcccatacattattgtgccccggctggttttgcgattctaaaatgtaata  
ataagacgttcaatggaacaggaccatgtacaaatgtcagcacagtagcaatgtacacatggaattaggcca  
gtagtatcaactcaactgctgttaaatggcagtcctggcagaagaagaggtagtaattagatctgccaattt  
cacagacaatgctaaaaccataatagtagcagctgaaccaatctgtagaaatttaattgtacaagacccaaca  
acaatacaagaaaaagtagtccgtatccagagaggaccagggagagcatttgttacaataggaaaaatagga  
aatatgagacaagcacattgttaacattagtagagcaaaaatggaataacactttaaaacagatagatagcaa  
attaagagaacaatttggaaataataaaacaataatctttaagcagtcctcaggaggggacccagaaattg  
taacgcacagttttaattgtggaggggaatttttctactgtaattcaacacaactgtttaatagtagtctgg  
tttaatagtagtctggagtagtaaaaggtcaataaacactgaaggaagtgcacaaatcaccctcccagtag  
aataaaaacaaattataaacatgtggcaggaagttaggaaaaagcaatgtatgcccctcccacagtggaacaaa  
ttagatgttcatcaaatattacagggctgctattaacaagagatgggtggtaatagcaaatgagtagtag  
atcttcagacctggaggaggagatagagggacaattggagaagtgaattatataaatataaagtagtaaa  
aattgaaccattagtagtagcaccacccaaggcaagagaagagtggtgcagACTAGTgcagtggaatag  
gagctttgttcccttgggttc

ΔCleavage site (agagaaaaaaga) → SpeI

ttgggagcagcaggaagcactatgggcgagcgtcaatgacgctgacggtagcagccagacaattattgtc  
tggtatagtgtagcagcagagaacaatttgtctgagggctatttgaggcgcaacagcatctgttgcaactcacag  
tctggggcatcaagcagctccaggcaagaatcctggctgtggaaagatacctaaaggatcaacagctcctg  
gggatttgggggttgcctgtgaaaactcatttgcaccactgctgtgccttgggaatgctagttggagtaataa  
atctctggaacagatttggaaataacatgacctggatggagtggaacagagaaatttaacaattacacaagct  
taatacactccttaattgaagaatcgcaaaaaccagcaagaaaagaatgaacaagaattattggaattagat  
aaatgggcaagtttgtggaattggtttaacataacaaattggctgtggtatataaaattattcataatgat  
agtaggaggttggtaggtttaagaatagtttttgcgtgactttctgtagtagaattagagtttaggcagggt  
attcaccattatcgtttcagacccacctcccaatcccaggggacccgacaggcccgaaggaatagaagaa  
gaaggtggagagagagagcagagacagatccattcgatttagtgaaacggatccttagcacttatctggttaa

**Figure 47**

**DNA Sequence of E<sup>m</sup>/E<sup>m</sup> (BH10) [SEQ ID NO: 24]:**

Gaattcgccaccatgggagtgaggagaaatatcagcacttgtggagatgg  
EcoRI Kozak NcoI  
gggtggagatggggcaccatgctccttgggatgttgatgatctgtagtgtacagaaaaattgtgggtcac  
agtctattatggggtacctgtgtggaaggaagcaaccaccactctattttgtgcatcagatgctaaagcat  
atgatacagaggtacataatgtttgggccacacatgcctgtgtacccacagaccccaaccacagaagta  
gtattggtaaatgtgacagaaaaattttaacatgtggaaaaatgacatggtagaacagatgcatgaggatat  
aatcagtttatgggatcaaaacctaaagccatgtgtaaaattaacccactctgtgttagtttaaagtga  
ctgatttgaagaatgataactaataccaatagtagtagcgggagaatgataatggagaaaggagagataaaa  
aactgctctttcaatatcagcacaagcataagaggttaaggtgcagaaagaatatgcattttttataaaact  
tgatataataccaatagataatgatactaccagctatacgttgacaagttgtaacacctcagtcattacac  
aggcctgtccaaaggtatcctttgagccaattcccatatattgtgccccggtgggttttgcgattcta  
aaatgtaataataagacgttcaatggaacaggaccatgtacaaatgtcagcacagtacaatgtacacatgg  
aattaggccagtagtatcaactcaactgctgttaaattggcagtcctggcagaagaagaggttagtaattagat  
ctgccaatttcacagacaatgctaaaaccataatagtagcagctgaaccaatctgtagaaattaattgtaca  
agcccaacaacaatacaagaaaaagtatccgtatccagagaggaccagggagagcatttgttacaatagg  
aaaaataggaaatatgagacaagcacattgtaacatttagtagagcaaaatggaataacactttaaaacaga  
tagatagcaaatgaagagaacaatttggaaataataaaaacaataatctttaagcagtcctcaggaggggac  
ccagaaattgtaacgcacagttttaattgtggaggggaatttttctactgtaattcaacacaactgtttaa  
tagtacttgggttaatatgacttggagtactaaaggggtcaaataacactgaaggaagtgcacaaatcacc  
tcccatgcagaataaaaacaaattataaacatgtggcaggaagtaggaaaagcaatgtatgccctcccatc  
agtggacaaattagatgttcatcaaatattacagggctgctattaacaagagatgggtggtaatagcaaaa  
tgagtccgagatcttcagacctggaggaggagatatgagggacaattggagaagtgaattatataaatata  
aagtagtaaaaattgaaccattaggagtagcaccaccaaaggcaaagagaagagtggtgcagagagaaaaa  
agagcagtggggaataggagctttgttccttgggttcttgggagcagcaggaagcactatgggagcagcgtc  
aatgacgctgacgggtacaggccagacaattattgtctggtatagtgacgacagacaacaatttgctgaggg  
ctattgagggcgcaacagcatctgttgcaactcacagtcctggggcatcaagcagctccaggcaagaatcctg  
gctgtggaaagatacctaaaggatcaacagctcctggggatttgggggtgctctggaaaactcatttgcac  
cactgctgtgccttgggaatgctagttggagtaataaatctctggaacagatttggaaataacatgacctgga  
tggagtgggacagagaaaattacaattacacaagcttaatacactccttaattgaagaatcgcaaaaccag  
caagaaaagaatgaacaagaattattggaattagataaatgggcaagtttgggaattgggtttaacataac  
aaattggctgtggtatataaaattattcataatgatagtaggaggttggtaggtttaagaatagtttttg  
ctgtactttctgtagtgaatagagtttaggcaggatattcaccattatcgtttcagacccacctcccaatc  
ccgaggggacccgacaggcccgaaaggaatagaagaagaaggtggagagagagacagagacagatccattcg  
attagtgaacggatccttagcacttatctgggacgatctgcggagcctgtgcctcttcagctaccaccgct  
tgagagacttactcttgattgtaacgaggattgtggaacttctgggacgcaggggggtgggaagccctcaa  
tattgggtggaatctcctacagtattggagtcaggagctaaagaatagtgtctgttagcttgctcaatgccac  
agctatagcagtagctgaggggacagataggggtatagaagtagtacaaggagcttatagagctattcgcc  
acatacctagaagaataagacagggttggaaaggattttgctataa

**FIGURE 48**

**Sequences of V3 loop Multi-clade HIV-1 Clones:**

Clade	ACC#	HIV-1 Strain	From(nt)	To(nt)
B	M15654	BH10	885	992
A	U09127	192UG037WHO.01083hED	888	992
C	U09126	192BR025WHO.01093hED	876	980
D	U43386	192UG024.2	888	989
E	U08458	193TH976.17	894	998
F	U27401	193BR020.17	888	992
G	U30312	192RU131.9	885	989

Tgtacaagacccaacaacaataacaagaaaaagtatccgtatccagagagga  
ccaggagagcatttggttacaataggaaaaataggaaatatgagacaagca  
cattgt **Clade B [SEQ ID NO: 25]**

Tgtaccagacctaacaacaataacaagaaaaagtgtacgtataggaccagga  
caaacattctatgcaacagggtgatataataggggatataagacaagcacat  
tgt **Clade A [SEQ ID NO: 26]**

Tgtacgagacccaacaataataacaagaaaaagtataaggataggaccagga  
caagcattctatgcaacaggagaaataataggagatataagacaagcacat  
tgt **Clade C [SEQ ID NO: 27]**

Tgcacaaggccctacaacaatataagacaaaggacccccataggactaggg  
caagcactctataacaagaagaatagaagatataagaagagcacattgt  
**Clade D [SEQ ID NO: 28]**

Tgtaccagaccctccaccaataacaagaacaagtatacgtataggaccagga  
caagtattctatagaacaggagacataacaggagatataagaaaagcatat  
tgt **Clade E [SEQ ID NO: 29]**

Tgtacaagacccaacaacaataacaagaaaaagaatatcttttaggaccagga  
cgagtattttatacagcaggagaaataataggagacatcagaaaggcacat  
tgt **Clade F [SEQ ID NO: 30]**

Tgtaccagacctaataacaataacaagaaaaagtataacttttgcaccagga  
caagcgctctatgcaacagggtgaaataataggagatataagacaagcacat  
tgt **Clade G [SEQ ID NO: 31]**

## FIGURE 49A

DNA sequence of modified Env including multi-clade V3 loops [SEQ ID NO: 32]:

Atgagagtgaaggagaaatcatcagcacttgtggagatgggggtggagatggggcaccatgctccttgggat  
gttgatgatctgtagtgtacagaaaaattgtgggtcacagtcattatggggtacctgtgtggaaggaag  
caaccaccactctatTTTTgtgcatcagatgctaaagcatatgatacagaggtacataatgtttgggccaca  
catgcctgtgtacccacagaccccaaccacaagaagtagtattggtaaatgtgacagaaaaattttaacat  
gtggaaaaatgacatggtagaacagatgcatgaggatataatcagtttatgggatcaaagcctaaagccat  
gtgtaaaattaacccactctgtgttggagctggtagttgtaacacctcagt  
V1, V2 deletion, GAG insertion  
Cattacacaggcctgttccaaaggtatcctttgagccaattcccatacattattgtgccccggctggttttg  
cgattctaaaatgtaataataagacgttcaatggaacaggaccatgtacaaatgtcagcacagtaaatgt  
acacatggaattaggccagtagtatcaactcaactgctgtttaaattggcagtcctggcagaagaagagtagt  
aattagatctgccaatttcacagacaatgctaaaaccataatagtagcagctgaaccaatctgtagaatta  
attgtacaagacccaacaaca  
Start of Clade B  
Tacaagaaaaagtatccgtatccagagaggaccagggagagcatttgttacaataggaaaaataggaaata  
tgagacaagcacattgtctcgggtgtaccag  
Insert a AvaI site Clade A  
Acctaacaacaatacaagaaaaagtgtacgtataggaccaggacaaacattctatgcaacagggtgatataa  
taggggatataagacaagcacattgtgtac  
Clade C  
Gagacccaacaataatacaagaaaaagtataaggataggaccaggacaagcattctatgcaacaggagaaa  
taataggagatataagacaagcacattgttg  
Clade D  
Cacaaggccctacaacaatataagacaaaggacccccataggactagggcaagcactctatacaacaagaa  
gaatagaagatataagaagagcacattgttg  
Clade E  
Taccagaccctccaccaatacaagaacaagtatacgtataggaccaggacaagtattctatagaacaggag  
acataacaggagatataagaaaaagcatattgtggtcctgtacaagacccaacaacaatacaagaaaaaga  
atatctttagg  
BamHI clade F  
Accaggacgagtattttatcacgaggagaaataataggagacatcagaaaggcacattgtgtaccagac  
ctaataacaatacaagaaaaagtataacttt  
Clade G  
Tgcaccaggacaagcgctctatgcaacagggtgaaataataggagatataagacaagcacattgtctcggga  
acattagtagagcaaaatggaataacacttt  
Insert a AvaI  
Aaaacagatagatagcaaattaagagaacaatttggaaataataaaacaataatctttaagcagtcctcag  
gaggggacccagaaattgtaacgcacagttttaattgtggagggaatttttctactgtaattcaacacaa  
ctgtttaatagtacttggtttaatagtacttggagtactaaagggtcaaataacactgaaggaagtgcac  
aatcacctcccatgcagaataaaacaaattataaaacatgtggcaggaagttaggaaaagcaatgtatgcc  
ctcccatcagtgagacaaattagatgttcatcaaatattacagggctgctattaacaagagatggtggtaat  
agcaacaatgagtcggagatcttcagacctggaggaggagatagagggacaattggagaagtgaattata  
taaatataaagtagtaaaaaattgaaccattaggagtagcacccaccaaggcaagagaagagtggtgcaga  
ctagtgcagtggg  
Cleavage site mutation (SpeI)  
Aataggagctttgttccttgggttcttgggagcagcaggaagcactatgggcgcagcgtcaatgacgctga  
cggtacaggccagacaattattgtctggtatagtgacgcagcagaacaatttgcgtgagggctattgagggc  
caacagcatctgttgcaactcacagctctggggcatcaagcagctccaggcaagaatcctggctgtggaag  
atacctaaaggatcaacagctcctggggatttgggggtgctctggaaaactcatttgcaccactgctgtgc  
cttggaatgctagttggagtaataaatctctggaacagatttggaaataacatgacctggatggagtgggac  
agagaaattaacaattacacaagcttaatacactccttaattgaagaatcgcaaaaccagcaagaaaaagaa  
tgaacaagaattattggaattagataaatgggcaagttgtggaattggtttaacataacaattggctgt  
ggtatataaaatcgtggctgctgctgctcctcctcctcctcctcagggccacggatttcatgtcc  
ctgtga  
GPI anchor

**FIGURE 49B**

**Amino acid sequence of modified Env including multi-clade V3 loops [SEQ ID NO: 33]:**

M T T A A E I V S K V G A P F T F R Y P T T G N A N G A G V L T M R N R P L T N G Q V M S E W A  
R M V S C N S G F C Q S K N V R Y P A Y T N D N G N E K N T F E W C N S T F L L I Q P T L L Y T  
V L Y D V F L A E N C L T N T P A N T N R T I N E T I W N H N G Q S E E K L T L K L W W I D I D  
K L Y A P N W G P N T A I N I N T N G N R R T T I R I N K S S E S S L A G V R Q L N M E K K F  
E G G K T M D S I K H E I T G N G N E I I T G R I K G N T F T D V N E Y K F Q A L G A E E W S M  
K M V A D W Q C P T G E V R K N D T I R E S D K G S D T I N W T G I I K R L A I Q I S W S A W S  
Y L P Y P K S N I F I E Q K I T I R I Q D D I I R D I I L I C F I K T F Y R G R E A W W D Q S L L  
Q M V D N N L T H N R V L S G R I K G R I R R I I T R K F G N T A G R K V A Q A R G S R N L L \*  
H I W T P D K S Y G P V N I N K G S D T R I K S R F Q Q K G S L M L P V V A L Q I C N E Q W L  
L C K E Q M P V C T V I Q R M S D I I P R G A L K A A I Q E T P Y L G V Q G L Q L S K I Q N L  
W S E V E V C I A G V R S I R V I R R I A P Y G A P H D S F W C A L G K T S S H A G S N E W L  
R A A H V E V T P P S S V Q Q R R I Q G H G C P H G C S S F S R P T G I S T G L V K L N K F L  
W T T N V Q K Q A C T A E R A I Q G A L C Q G G C Q L K G Y T I P R D E A M I L E L E Y N N S  
G E T V L M L A G T Q N I G H G A P H G C V S R C A G L G C K K I D M P V G V Q R I Q T E I L  
W K T W V H T C F N L F N P C P H G C Q T F C V T L N R D N G Q S G R L G A Q L Y C I S Q T S  
R L L A N E P P A V L T C G L G C C Q C A R Y T F R Y I E P S S I G G D G I A Q T L T W L E N L  
W W F T V D L K I S L D T R G Q C A T L P R R Y P A S Q E T N I Q N N V G S Q V K T N I L W L  
G V C H T I C V L T N N R A C T F R Y S T P T N T R F I Q N N I S W A A M N W D A N H L L Q

33:1-33:333

## FIGURE 50A

### 1. DNA sequence of p17/24 in natural form [SEQ ID NO: 34]:

atgggtgcgagagcgtcagtattaagcgggggagaattagatcgatgggaaaaaattcgggttaaggccagg  
gggaaagaaaaatatataaattaaaacatatagtatgggcaagcagggagctagaacgattcgcagttaatc  
ctggcctgttagaaaacatcagaaggctgtagacaaatactgggacagctacaaccatcccttcagacagga  
tcagaagaacttagatcattatataatacagtagcaaccctctattgtgtgcatcaaaggatagagataaa  
agacaccaaggaagcttttagacaagatagaggaagagcaaaacaaaagtaagaaaaaagcacagcaagcag  
cagctgacacaggacacagcagtcaggtcagccaaaattaccctatagtgagaacatccagggggcaaatg  
gtacatcaggccatatacctagaacttttaaatgcatgggtaaaagtagtagaagagaaggctttcagccc  
agaagtaatacccatgttttcagcattatcagaaggagccaccccacaagatttaaacaccatgctaataca  
cagtggggggacatcaagcagccatgcaaatgttaaaagagaccatcaatgaggaagctgcagaatgggat  
aggtacatccagtgcatgcagggcctattgcaccaggccagatgagagaaccaaggggaagtgcacatagc  
aggaactactagtagcccttcaggaacaaataggatggatgacaaataatccacctatcccagtaggagaaa  
tttataaaagatggataatcctgggattaaataaaatagtaagaatgtatagccctaccagcattctggac  
ataagacaaggacaaaagaaccttttagagactatgtagaccggttctataaaaactctaagagcccgagca  
agcttcacaggaggtaaaaaattggatgacagaaaccttgttgggtccaaaatgcgaaccagattgtaaga  
ctattttaaaagcattgggaccagcggtacactagaagaatgatgacagcatgtcagggagtaggagga  
cccgccataaggcaagagttttgtaa

### 2. DNA sequence of p17/24 in secreted form [SEQ ID NO: 35]:

atgagagtgaaggagaaatatcagcacttgtggagatgggggtggagatgg  
gp120 signal peptide  
ggcaccatgctccttgggatgttgatgatctgtagtgtggtgcgagagcg  
p17/p24

tcagtattaagcgggggagaattagatcgatgggaaaaaattcgggttaaggccaggggggaaagaaaaata  
taaattaaaacatatagtatgggcaagcagggagctagaacgattcgcagttaatcctggcctgttagaaa  
catcagaaggctgtagacaaatactgggacagctacaaccatcccttcagacaggatcagaagaacttaga  
tcattatataatacagtagcaaccctctattgtgtgcatcaaaggatagagataaaagacaccaaggaagc  
tttagacaagatagaggaagagcaaaacaaaagtaagaaaaaagcacagcaagcagcagctgacacaggac  
acagcagtcaggtcagccaaaattaccctatagtgagaacatccagggggcaaatggtacatcaggccata  
tcacctagaacttttaaatgcatgggtaaaagtagtagaagagaaggctttcagcccagaagtaatacccat  
gttttcagcattatcagaaggagccaccccacaagatttaaacaccatgctaatacagtggggggacatc  
aagcagccatgcaaatgttaaaagagaccatcaatgaggaagctgcagaatgggatagagtacatccagt  
catgcagggcctattgcaccaggccagatgagagaaccaaggggaagtgcacatagcaggaactactagtag  
ccttcaggaacaaataggatggatgacaaataatccacctatcccagtaggagaaatttataaaagatgga  
taatcctgggattaaataaaatagtaagaatgtatagccctaccagcattctggacataagacaaggacca  
aaagaaccttttagagactatgtagaccggttctataaaaactctaagagccgagcaagcttcacaggagg  
aaaaaattggatgacagaaaccttgttgggtccaaaatgcgaaccagattgtaagactattttaaaagcat  
tgggaccagcggtacactagaagaatgatgacagcatgtcagggagtaggaggacccggccataaggca  
agagttttgtaa



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t  
cagtgattaaagcgggggagaattagatcgatgggaaaaaattcggttaagggccagggggaaagaaaaaata  
taaattaaaaacatatgatatgggcaagcaggagactgaacgatttcgcagttaatcctggcctgttagaaa  
catcagaaggctgtagacaaatactgggacagctacaaccatcccttcagacaggatcagaagaacttaga  
tcattatataataacagtagcaacccctctattgtgtgcatcaaaggatagagataaaagacaccaaggaagc  
tttagacaagatagaggaagagcaaaacaaaagtaagaaaaaagcacagcaagcagcagctgacacaggac  
acagcagtcaggtcagccaaaattaccctatagtgagaacatccagggggcaaatggtagactcaggccata  
tcacctagaacttttaaatgcatgggtaaaagtagtagaagagaaggcttcagcccagaagtaatacccat  
gttttcagcattatcagaaggagccacccccacaagatttaaacaccctgctaaacacagtggggggacatc  
aagcagccatgcaaatgttaaaagagaccatcaatgaggagctgcagaatgggatagagtacatccagtg  
catgcagggcctatttcaccaggccagatgagagaaccaagggggaagtgcatagcaggaactactagtac  
ccttcaggagcaaaataggatggatgacaaataatccacctatcccagtaggagaaatttataaaagatgga  
taatcctgggattaaataaaaatagtaagaatgtatagccctaccagcattctggacataagacaaggacca  
aaagaaccttttagagactatgtagaccggttctataaaactctaagagccgagcaagcttcacaggaggt  
aaaaaattggatgacagaaacctgttgggtccaaaatgcgaacccagattgtgaagactttttaaagcat  
tgggaccagcggtacactagaagaatgatgacagcatgtcagggagtaggaggacccggccataaggca  
agagtttgg  
gtattcataatgatagtaggaggcttggtaggtttaagaatagtttttgctgtactttctgtagtgaatag  
agttaggcagggatattcaccattatcgtttcagacccacctcccaatcccagggggataa  
gp41 transmembrane domain

**FIGURE 50B**

**1. Amino acid sequence of p17/24 in natural form [SEQ ID NO: 37]:**

M I A E E R N Q Q A P Q P D N N P E N L R  
G R S G E I K V A F Q M V I P K K Q A E V  
A L R C L E S S I S D L H A P I E A N E L  
R R E R R I K Q S P L K A G I V P S P M \*  
A P L Q S K K N P E N E G T P R F Q D M  
S G E I L D K Y R V T P T V M R E C T  
V G R L Y T A P T I M I S G Y D V K A  
L K F G N K Q I L P L N A T E S Y K T C  
S K A Q T E Q V N M N E P L I P V N I Q  
G K V L V A A Q A F T E G Q Y T D W L G  
G Y N Q A L A N W S V A Q E K S R M K V  
E K P P T D A I V A G A M Q R I F T A G  
L L G S L K D Q K L G E R I W L Y E L G  
D K L L Y I T G V S H W E G I D K T G P  
R H L Q C E G Q V E Q D P W I I T L P G  
W I E T V E H M E G A R R M L R L A H  
E V T G H E S V E A A V G T G Q R V A K  
K W S S Q Q S H K T M H S N L G A Q T A

**2. Amino acid sequence of p17/24 in secreted form [SEQ ID NO: 38]:**

M T L K F G N K Q Q Q I L P L N A T E S Y T C  
R M S K A Q T E Q Q Q V N M N E P L I P V I Q  
V L G K V L V A A A Q A F T E G Q Y T D L G  
K L G Y N Q A L A A A N W S V A Q E K S R K V  
E G E K P P T D A A A I V A G A M Q R I F A G  
K M L L G S L K D D D Q K L G E R I W L Y L G  
Y L D K L L Y I T T G V S H W E G I D K G P  
Q M R H L Q C E G G Q V E Q D P W I I T P G  
H I W I E T V E H H M E G A R R M L R L A H  
L C E V T G H E S S S V E A A V G T G Q R A K  
W S K W S S Q Q S S S H K T M H S N L G A T A  
R A I A E E R N Q Q Q A P Q P D N N P E L R  
W G R S G E I K V V V A F Q M V I P K K Q E V  
G A L R C L E S S S S I S D L H A P I E A E L  
W R R E R R I K Q Q Q S P L K A G I V P S M \*  
R A P L Q S K K N N N P E N E G T P R F Q M  
W S G E I L D K Y Y R V T T P T V M R E T  
G V G R L Y T A P P T I M I S G Y D V A

**FIGURE 50B-continued**

**1. Amino acid sequence of p17/24 in membrane bound form [SEQ ID NO: 39]:**

M T L L K F G N K Q I L P L N A T E S Y K T C I N P  
R M S S K A Q T E Q V N M N E P L I P V N I Q V R R  
V L G G K V L V A A Q A F T E G Q Y T D W L G G V G  
K L G G Y N Q A L A N W S V A Q E K S R M K V G R \*  
E G E E K P P T D A I V A G A M Q R I F T A G L Q  
K M L L L G S L K D Q K L G E R I W L Y E L G V G  
Y L D D K L L Y I T G V S H W E G I D K T G P G Y  
Q M R R H L Q C E G Q V E Q D P W I I T L P G L S  
H I W W I E T V E H M E G A R R M L R L L A H R P  
L C E E V T G H E S V E A A V G T G Q R V A K I L  
W S K K W S S Q Q S H K T M H S N L G A Q T A V S  
R A I I A E E R N Q Q A P Q P D N N P E N L R F F  
W G R R S G E I K V A F Q M V I P K K Q A E V A Q  
G A L L R C L E S S I S D L H A P I E A N E L V T  
W R R R E R R I K Q S P L K A G I V P S P M L L H  
R A P P L Q S K K N P E N E G T P R F Q D M F S L  
W S G G E I L D K Y R V T T P T V M R E C T I V P  
G V G G R L Y T A P T I M I S G Y D V K A M V I

2044240" 520220001

## FIGURE 51A

### 1. DNA sequence of p17 in natural form [SEQ ID NO: 40]:

atgggtgcgagagcgctcagtattaagcgggggagaattagatcgatgggaaaaaattcg  
gttaaggccagggggaaagaaaaaatataaattaaaacatatagtatgggcaagcaggg  
agctagaacgattcgcagttaatcctggcctgttagaaacatcagaaggctgtagacaa  
atactgggacagctacaacatcccttcagacaggatcagaagaacttagatcattata  
taatacagtagcaaccctctattgtgtgcatcaaaggatagagataaaagacaccaagg  
aagcttttagacaagatagaggaagagcaaaacaaaagtaagaaaaaagcacagcaagca  
gcagctgacacaggacacagcagtcaggtcagccaaaattactaa

### 2. DNA sequence of p17 in secreted form [SEQ ID NO: 41]:

atgagagtgaaggagaaatatcagcacttgtggagatgggggtggagatgg  
gp120 signal peptide  
ggcaccatgctccttgggatgttgatgatctgtagtgtcgggtgcgagagcg  
p17  
tcagtattaagcgggggagaattagatcgatgggaaaaaattcggttaaggccaggggg  
aaagaaaaaatataaattaaaacatatagtatgggcaagcagggagctagaacgattcg  
cagttaatcctggcctgttagaaacatcagaaggctgtagacaaatactgggacagcta  
caaccatcccttcagacaggatcagaagaacttagatcattatataatacagtagcaac  
cctctattgtgtgcatcaaaggatagagataaaagacaccaaggaagcttttagacaaga  
tagaggaagagcaaaacaaaagtaagaaaaaagcacagcaagcagcagctgacacagga  
cacagcagtcaggtcagccaaaattactaa

### 3. DNA sequence of p17 in membrane bound form [SEQ ID NO: 42]:

atgagagtgaaggagaaatatcagcacttgtggagatgggggtggagatgg  
gp120 signal peptide  
ggcaccatgctccttgggatgttgatgatctgtagtgtcgggtgcgagagcg  
p17  
tcagtattaagcgggggagaattagatcgatgggaaaaaattcggttaaggccaggggg  
aaagaaaaaatataaattaaaacatatagtatgggcaagcagggagctagaacgattcg  
cagttaatcctggcctgttagaaacatcagaaggctgtagacaaatactgggacagcta  
caaccatcccttcagacaggatcagaagaacttagatcattatataatacagtagcaac  
cctctattgtgtgcatcaaaggatagagataaaagacaccaaggaagcttttagacaaga  
tagaggaagagcaaaacaaaagtaagaaaaaagcacagcaagcagcagctgacacagga  
cacagcagtcaggtcagccaaaattac  
ttattcataatgatagtaggaggcttggtaggtttaagaatagtttttgcgtgtactttc  
tgtagtgaatagagtttaggcagggatattcaccattatcgtttcagacccacctcccaa  
tcccaggggataaa  
gp41 transmembrane domain

**THE**

[illegible]

**2. Amino acid sequence of p17 in secreted form [SEQ ID NO: 44]:**

**3. Amino acid sequence of p17 in membrane bound form [SEQ ID NO: 45]:**

M	R	V	K	E	K	Y	Q	H	L	W	R	W	G	W	R	W	G
T	M	L	L	G	M	D	M	I	C	S	A	G	A	R	A	S	G
L	S	G	L	E	L	K	R	W	E	K	I	R	L	R	P	R	E
K	K	K	S	K	L	L	H	I	V	W	A	S	R	E	E	E	R
N	Q	L	L	P	S	I	Q	T	G	S	E	E	L	I	R	R	R
K	T	V	Q	T	S	Y	C	V	H	Q	R	I	E	K	I	R	R
Q	E	A	A	D	L	I	E	E	E	G	E	R	S	Q	K	E	E
F	I	A	I	A	K	T	G	H	S	L	N	V	S	F	N	K	E
S	V	V	N	V	D	G	L	V	G	S	R	I	S	F	A	Y	E
L	P	I	P	R	G	*	Q	G	Y	S	P	L	S	F	Q	V	L

**FIGURE 52B**

**1. Amino acid sequence of p24 in natural form [SEQ ID NO: 49]:**

M	P	I	V	Q	N	I	Q	G	Q	M	V	H	Q	A	I	S	P	P
R	T	L	N	A	W	V	K	V	V	E	E	K	A	F	S	D	L	E
V	I	P	M	F	S	A	L	S	E	G	A	T	P	Q	M	L	K	N
T	M	L	N	T	V	G	G	H	Q	A	A	M	Q	M	H	A	A	G
T	I	N	E	E	A	A	E	W	D	R	V	H	P	V	I	P	I	T
P	I	A	P	Q	Q	Q	R	E	P	R	G	S	D	I	A	P	G	R
T	S	T	I	Y	K	R	I	I	W	M	T	N	N	K	I	V	P	F
V	G	E	P	T	S	I	L	I	I	L	Q	L	P	K	E	P	S	Q
M	Y	S	V	D	R	F	Y	D	I	R	R	G	E	Q	A	N	S	D
R	D	Y	N	W	M	T	E	K	T	L	V	A	N	A	E	L	M	M
E	V	K	I	L	K	A	L	G	P	A	K	A	L	E	L	*		
C	K	T	Q	G	V	G	G	P	G	H			R	V				
T	A	C	Q	G	V	G	G	P	G									

**2. Amino acid sequence of p24 in secreted form [SEQ ID NO: 50]:**

M	R	V	K	E	K	Y	Q	H	L	W	R	W	G	W	R	W	G
T	M	L	L	G	M	L	M	I	C	S	A	P	I	V	Q	N	I
Q	G	Q	M	V	H	Q	A	I	S	P	R	T	L	N	A	F	V
K	V	V	E	E	K	A	F	I	S	P	V	I	P	L	T	S	A
L	S	Q	A	A	T	P	Q	D	L	K	T	M	N	N	E	V	G
G	H	Q	A	A	M	Q	M	L	H	A	P	I	I	P	P	Q	A
E	W	D	R	V	S	D	V	A	G	T	P	S	A	N	T	E	M
R	E	P	R	G	N	N	I	P	I	P	V	Y	E	P	Y	K	R
I	G	W	M	T	N	N	P	K	I	R	M	D	S	I	T	S	I
W	I	I	L	Q	L	P	K	E	V	F	R	V	Y	P	D	R	F
L	D	T	R	R	G	N	Q	A	S	Q	E	N	K	V	W	M	T
Y	K	L	L	A	Q	L	A	N	P	D	C	I	T	I	L	K	A
E	T	P	A	K	T	R	E	E	M	M		A	C	Q	G	V	G
L	G	G	H	K	A	R	V	L	*								

**3. Amino acid sequence of p24 in secreted form [SEQ ID NO: 51]:**

M	R	V	K	E	K	Y	Q	H	L	W	R	W	G	W	R	W	G
T	M	L	L	G	M	L	M	I	C	S	A	P	I	V	Q	N	I
Q	G	Q	M	V	H	Q	A	I	S	P	R	T	L	N	A	F	V
K	V	V	E	E	K	A	F	I	S	P	V	I	P	L	T	S	A
L	S	Q	A	A	T	P	Q	D	L	K	T	M	N	N	E	V	G
G	H	Q	A	A	M	Q	M	L	H	A	P	I	I	P	P	Q	A
E	W	D	R	V	S	D	V	A	G	T	P	S	A	N	T	E	M
R	E	P	R	G	N	N	I	P	I	P	V	Y	E	P	Y	K	R
I	G	W	M	T	N	N	P	K	E	R	M	D	S	I	T	S	I
W	I	I	L	Q	L	P	K	E	V	F	R	V	Y	P	D	R	F
L	D	T	R	R	G	N	Q	A	S	Q	E	N	K	V	W	M	T
Y	K	L	L	A	Q	L	A	N	P	D	C	I	T	I	L	K	A
E	T	P	A	K	T	R	E	E	M	M		A	C	Q	G	V	G
L	G	G	H	K	A	R	V	L	*								

### FIGURE 53A

DNA sequence of modified Env including multi-clade V3 loops and Tat  
[SEQ ID NO: 52]:

Gaattctgcaacaactgctgtttatccattttcagaattgggtgtcgacatagcagaataggcgt  
tactcgacagaggagagcaagaaatggagccagtagatcctagactagagccc

Tat1

Tggaagcatccaggaagtcagcctaaaactgcttgtagcaattgctattgtaaaaagtgttgctt  
tcattgccaaagtttgtttcatacaaaaagccttaggcattctcctatggcaggaagaagcggagac  
agcgacgaagacctcctcaaggcagtcagactcatcaagtttctctatcaaagcagtaagtagta  
catgtaattgcaacctatacaaatagcaatagtagcatttagtagtagcaataataatagcaatagt  
tgtgtggtccatagtaattcatagaatataggaaaaatattaagacaaaagaaaaatagacaggttaa  
ttgatagactaatagaaaagagcagaagacagtgaggcaatgagagtggaaggagaaatatcagcactt  
tgggagatgggggtggagatggg

Envelope

Gcaccatgctccttgggatgttgatgatctgtagtgtacagaaaaattgtgggtcacagtctat  
tatggggtacctgtgtggaaggaagcaaccaccactctattttgtgcatcagatgttaaagcata  
tgatacagaggtacataatgtttgggccacacatgcctgtgtacccacagaccccaaccacaaag  
aagtagtattggtaaagtgtgacagaaaaattttaacatgtggaaaaatgacatggtagaacagatg  
catgaggatataatcagtttatgggatcaaagcctaaagccatgtgtaaaattaacccactctg  
tgttggagctggtagttgtaacacctca

Delete V1V2, insert Gly,Ala,Gly

gtcattacacaggcctgtccaaaggtatcctttgagccaattcccatattattgtgccccggc  
tggttttgcgattctaaaatgtaataataagacgttcaatggaacaggaccatgtacaaatgtca  
gcacagtacaatgtacacatggaattaggccagtagtatcaactcaactgctgttaaattggcagt  
ctggcagaagaagaggtagtaattagatctgccaaatttcacagacaatgctaaaaccataatagt  
acagctgaaccaatctgtagaattaattgttacaag

First multi-clade repeat

Acccaacaacaatacaagaaaaagtatccgtatccagagaggaccagggagagcatttgttacaa  
taggaaaaataggaaatatgagacaagcacattgtctcggtgtaccagacctaacaacaataca  
agaaaaagtgtacgtataggaccaggacaaacattctatgcaacaggtgatataataggggat  
aagacaagcacattgttgtagcagacccaacaataatacaagaaaaagtataaggataggaccag  
gacaagcattctatgcaacaggagaaataataggagatataagacaagcacattgttgcaaaag  
ccctacaacaataaagacaaaaggacccccataggactagggaagcactctatacaacaagaag  
aatagaagatataagaagagcacattgttgtagcagacccctccaccaatacaagaacaagtatac  
gtataggaccaggacaagtattctatagaacaggagacataacaggagatataagaaaagcatat  
tgtggatcctgtacaagacccaacaacaatacaagaaaaagaatatctttaggaccaggacgagt  
atatttatacagcaggagaaataataggagacatcagaaaggcacattgttgtagcagacctaata  
acaatacaagaaaaagtataaacttttgaccaggacaagcgctctatgcaacaggtgaaataata  
ggagatataagacaagcacattgtctcgggtgtaccagacctaacaacaata

Second multi-clade repeat

Caagaaaaagtgtacgtataggaccaggacaaacattctatgcaacaggtgatataataggggat  
ataagacaagcacattgttgtagcagacccaacaataatacaagaaaagtataaggataggacc  
aggacaagcattctatgcaacaggagaaataataggagatataagacaagcacattgttgcaaa  
ggccctacaacaataaagacaaaaggacccccataggactagggaagcactctatacaacaaga  
agaatagaagatataagaagagcacattgttgtagcagacccctccaccaatacaagaacaagtat  
acgtataggaccaggacaagtattctatagaacaggagacataacaggagatataagaaaagcat  
attgtggatcctgtacaagacccaacaacaatacaagaaaaagaatatctttaggaccaggacga  
gtattttatacagcaggagaaataataggagacatcagaaaggcacattgttgtagcagaccta  
taacaatacaagaaaaagtataaacttttgaccaggacaagcgctctatgcaacaggtgaaataa

**FIGURE 53A-continued**

taggagatataagacaagcacattgtctcggaacattagtagagcaaaatggaataacacttt

AvaI site, end of two multi-clade repeat

Aaaacagatagatagcaaatgaagagaacaatttggaataataaaacaataatctttaagcagt  
cctcaggaggggacccagaaattgtaacgcacagttttaattgtggaggggaatttttctactgt  
aattcaacacaactgtttaatagtacttgggttaatagtacttggagtactaaaggggtcaaataa  
cactgaaggaagtgcacacatcacctcccatgcagaataaaacaaattataaacatgtggcagg  
aagtaggaaaagcaatgtatgcccctcccatcagtggaacaaattagatgttcatcaaatattaca  
gggctgctattaacaagagatgggtggaatagcaacaatgagtcgagatcttcagacctggagg  
aggagatatgagggacaattggagaagtgaattatataaaatataaagtagtaaaaattgaacat  
taggagtagcaccacccaaggcaagagaagagtggtgcagactagtgcagtggaataggagct  
ttgttccttgg

Delete the cleavage site, insert SpeI site

gttcttgggagcagcaggaagcactatgggcgcagcgtcaatgacgctgacggtacaggccagac  
aattattgtctggtatagtgcagcagcagaacaatttgctgagggtattgaggcgcaacagcat  
ctgttgcaactcacagtctggggcatcaagcagctccaggcaagaatcctggctgtggaaagata  
cctaaaggatcaacagctcctggggatttggtggtgctctggaaaactcatttgcaccactgctg  
tgccttggaaatgctagtgtggagtaataaatctctggaacagatttggaataacatgacctggatg  
gagtgggacagagaaaattaacaattacacaagcttaatacactccttaattgaagaatcgcaaaa  
ccagcaagaaaagaatgaacaagaattattggaattagataaatgggcaagtttgtggaattggt  
ttaacataacaaattggctgtggtatataaaattattcataatgatagtaggaggcttggttaggt  
ttaagaatagtttttgcgtgactttctgtagtgaatagagtttaggcagggatattcaccattatc  
gtttcagacccacctccaatcccgaggggacccgacaggcccgaaggaatagaagaagaagggtg  
gagagagagacagagacagatccattcgattagtgaaacggatccttagcacttatctggtaa

gp41, delete the 300 bp at C-terminal

2042425363637



1990

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159	2160	2161	2162	2163	2164	2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191	2192	2193	2194	2195	2196	2197	2198	2199	2200	2201	2202	2203	2204	2205	2206	2207	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223	2224	2225	2226	2227	2228	2229	2230	2231	2232	2233	2234	2235	2236	2237	2238	2239	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255	2256	2257	2258	2259	2260	2261	2262	2263	2264	2265	2266	2267	2268	2269	2270	2271	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287	2288	2289	2290	2291	2292	2293	2294	2295	2296	2297	2298	2299	2300	2301	2302	2303	2304	2305	2306	2307	2308	2309	2310	2311	2312	2313	2314	2315	2316	2317	2318	2319	2320	2321	2322	2323	2324	2325	2326	2327	2328	2329	2330	2331	2332	2333	2334	2335	2336	2337	2338	2339	2340	2341	2342	2343	2344	2345	2346	2347	2348	2349	2350	2351	2352	2353	2354	2355	2356	2357	2358	2359	2360	2361	2362	2363	2364	2365	2366	2367	2368	2369	2370	2371	2372	2373	2374	2375	2376	2377	2378	2379	2380	2381	2382	2383	2384	2385	2386	2387	2388	2389	2390	2391	2392	2393	2394	2395	2396	2397	2398	2399	2400	2401	2402	2403	2404	2405	2406	2407	2408	2409	2410	2411	2412	2413	2414	2415	2416	2417	2418	2419	2420	2421	2422	2
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R	M	V	S	C	N	S	G	F	C	Q	S	K	N	V	R	Y	P	A	Y	T	N	D	N	G	N	E	N	G	N	E	I	T	G	R	I	K	G	N	T	F	D	V	N	E	Y	K	F	Q	A	L	G	A	E	E	W	L	H	G	I		
V	L	Y	D	V	F	L	A	E	N	C	L	T	N	T	P	A	N	T	N	R	T	I	N	E	T	I	N	D	T	I	R	E	S	D	K	G	S	D	T	I	N	W	T	G	I	I	K	R	L	A	I	Q	I	S	W	S	A	F	L	E	W
K	L	Y	A	P	N	W	G	P	N	T	A	I	N	I	N	T	N	G	N	R	T	I	R	I	T	I	R	I	Q	D	I	I	R	D	I	I	L	I	C	F	I	K	T	F	Y	R	G	R	E	A	W	D	Q	S	I	P	R	*			
E	G	G	K	T	M	D	S	I	K	H	E	I	T	G	N	G	N	E	I	I	T	G	R	I	K	G	R	I	R	I	I	T	R	K	F	G	N	T	A	G	R	K	V	A	Q	A	R	G	S	R	N	L	M	I	D						
K	M	V	A	D	W	Q	C	P	T	G	E	V	R	K	N	D	T	I	R	E	S	D	K	G	S	D	T	R	I	K	S	R	F	Q	K	G	S	L	M	L	P	V	A	L	Q	I	C	N	E	Q	W	I	P	R							
Y	L	P	Y	P	K	S	N	I	F	I	E	Q	K	I	T	I	R	I	Q	D	I	I	R	D	I	I	S	D	I	I	P	R	G	A	L	K	A	A	I	Q	E	T	P	Y	L	G	V	Q	G	L	Q	L	S	K	I	Q	N	V	R	D	
Q	M	V	D	N	N	L	T	H	N	R	V	L	S	G	R	I	K	G	R	I	R	I	I	T	R	V	I	R	R	I	A	P	Y	G	A	P	H	D	S	F	W	C	A	L	G	K	T	S	S	H	A	G	S	N	E	W	G	R			
H	I	W	T	P	D	K	S	Y	G	P	V	N	I	N	K	G	S	D	T	R	I	K	S	R	F	Q	R	R	I	Q	H	G	C	P	H	G	C	S	S	F	S	R	P	T	G	I	S	T	G	L	V	K	L	N	K	F	G	P	S		
L	C	K	E	Q	M	P	V	C	T	V	I	Q	R	M	S	D	I	I	P	R	G	A	L	K	A	A	I	Q	G	A	L	C	Q	G	C	Q	L	K	G	Y	T	I	P	R	D	E	A	M	I	L	E	L	E	Y	N	N	L	D	I		
W	S	E	V	E	V	C	I	A	G	V	R	S	I	R	V	I	R	R	I	A	P	Y	G	A	P	H	G	A	P	H	G	C	V	S	R	C	A	G	L	G	C	K	I	D	M	P	V	G	V	Q	R	I	Q	T	E	I	V	R	R		
R	A	A	H	V	E	V	T	P	P	S	S	V	Q	Q	R	R	I	Q	H	G	C	P	H	G	C	P	H	G	C	Q	T	F	C	V	T	L	N	R	D	N	G	Q	S	G	R	L	G	A	Q	L	Y	C	I	S	Q	T	G	P	L		
W	T	T	N	V	Q	K	Q	A	C	T	A	E	R	A	I	Q	G	A	L	C	Q	G	C	Q	L	G	C	Q	C	A	R	Y	T	F	R	Y	I	E	P	S	S	I	G	G	D	G	I	A	Q	T	L	T	W	L	E	N	L	E	V		
G	E	T	V	L	M	L	A	G	T	Q	N	I	G	H	G	A	P	H	G	C	V	S	R	C	A	G	Q	C	A	T	L	P	R	R	Y	P	A	S	Q	E	T	N	I	Q	N	N	V	G	S	Q	V	K	T	N	I	L	W	R	G	N	
W	K	T	W	V	H	T	C	F	N	L	F	N	P	C	P	H	G	C																																											

## FIGURE 54A

DNA sequence of modified Env including multi-clade V3 loops, Tat and Rev  
[SEQ ID NO: 54]:

gaattctgcaacaactgctgtttatccattttcagaattgggtgtcgacatagcagaat  
aggcgttactcgacagaggagagcaagaaatggagccagtagatcctagactagagccc

Tat1

tggaagcatccaggaagtcagcctaaaactgcttgtagccaattgctattgtaaaaagt  
ttgctttcattgccaagtttgtttcataacaaaagccttaggcattctcctatggcagga

Rev1

agaagcggagacagcgacgaagacctcctcaaggcagtcagactcatcaagtttctcta  
tcaaagcagtaagtagtacatgtaatgcaacctatacaaatagcaatagtagcattagt  
agtagcaataataatagcaatagttgtgtgggtccatagtaatcatagaatatagggaaa  
tattaagacaaaagaaaaatagacagggttaattgatagactaatagaaagagcagaagac  
agtggcaatgagagtggaaggagaaatatcagcacttgtggagatgggggtggagatggg

Envelope

Gcaccatgctccttgggatgttgatgatctgtagtgtctacagaaaaattgtgggtcaca  
gtctattatggggtacctgtgtggaaggaagcaaccaccactctattttgtgcatcaga  
tgctaaagcatatgatacagaggtacataatgtttggggccacacatgcctgtgtacca  
cagaccccaaccacagaagtagtattggtaaattgtgacagaaaattttaacatgtgg  
aaaaatgacatggtagaacagatgcatgaggatataatcagtttatgggatcaaagcct  
aaagccatgtgtaaaattaaccccactctgtgttggagctggtagttgtaacacctca

Delete V1V2, insert Gly,ala,gly

gtcattacacaggcctgtccaaaggtatcctttgagccaattcccatacattattgtgc  
cccggctggttttgcgattctaaaatgtaataataagacggtcaatggaacaggaccat  
gtacaaatgtcagcacagtacaatgtacacatggaattaggccagtagtatcaactcaa  
ctgctgttaaattggcagctctggcagaagaagaggtagtaattagatctgccaatttcac  
agacaatgctaaaaccataatagtacagctgaaccaatctgtagaaattaattgtacaa  
g

First multi-clades repeat

Acccaacaacaataacaagaaaaagtatccgtatccagagaggaccagggagagcatttg  
ttacaataggaaaaataggaaatatgagacaagcacattgtctcggtgtaccagacct  
aacaacaatacaagaaaaagtgtacgtataggaccaggacaaacattctatgcaacagg  
tgatataataggggatataagacaagcacattgttgtagcagagaccaacaataatacaa  
gaaaaagtataaggataggaccaggacaagcattctatgcaacaggagaaataatagga  
gatataagacaagcacattgttgcaagggcctacaacaatataagacaaaggacccc  
cataggactagggaagcactctatacaacaagaagaatagaagatataagaagagcac  
attgttgtagcagacctccaccaatacaagaacaagtatacgtataggaccaggacaa  
gtattctatagaacaggagacataacaggagatataagaaaagcatattgtggatcctg  
tacaagacccaacaacaatacaagaaaaagaatatctttaggaccaggacgagatttt  
atacagcaggagaaataataggagacatcagaaaggcacattgttgtagcagacctaat  
aacaatacaagaaaaagtataacttttgaccaggacaagcgctctatgcaacagggtga  
aataataggagatataagacaagcacattgtctcggtgtaccagacctaacacaata

Second multi-clade repeat

caagaaaaagtgtacgtataggaccaggacaaacattctatgcaacagggtgatataata  
ggggatataagacaagcacattgttgtagcagagaccaacaataatacaagaaaaagtat

## FIGURE 54A-continued

aaggataggaccaggacaagcattctatgcaacaggagaaataataggagatatagac  
aagcacattgttgcacaaggccctacaacaatatagacaaaggacccccataggacta  
gggcaagcactctatacaacaagaagaatagaagatatagaagagcacattgttgta  
cagaccctccaccaataacaagaacaagtatacgtataggaccaggacaagtattctata  
gaacaggagacataacaggagatatagaagaaagcatattgtggatcctgtacaagacc  
aacaacaataacaagaaaaagaatatctttaggaccaggacgagtattttatacagcagg  
agaaataataggagacatcagaaaggcacattgttgtaccagacctaataacaatacaa  
gaaaaagtataacttttgcaccaggacaagcgctctatgcaacagggtgaaataatagga  
gatataagacaagcacattgtctcgggaacattagtagagcaaaatggaataacacttt

AvaI site, end of two multi-clade repeat

Aaaacagatagatagcaaattaagagaacaatttggaaataataaaaacaataatcttta  
agcagtcctcaggaggggacccagaaattgtaacgcacagttttaattgtggaggggaa  
tttttctactgttaattcaacacaactgtttaatagtacttggtttaatagtacttggag  
tactaaaggggtcaaataacactgaaggaagtgcacaatcacccctcccatgcagaataa  
aacaattataaacatgttggcaggaagttaggaaaagcaatgtatgcccctcccatcagt  
ggacaaattagatgttcatcaaatattacagggtgctattaacaagagatggtggttaa  
tagcaacaatgagtcagatcttcagacctggaggaggagatatgagggacaattgga  
gaagtgaattatataaatataaagtagtaaaaaattgaaccattaggagtagcaccacc  
aaggcaaagagaagagtgggtgcagactagtgcagtggggaataggagctttgttccttgg

Delete the cleavage site, insert SpeI

gttcttgggagcagcaggaagcactatgggctgcacgtcaatgacgctgacggtacagg  
ccagacaattattgtctgatatagtgcagcagcagaacaatttgctgagggtatttgag  
gcgcaacagcatctgttgcaactcacagtctggggcatcaaacagctccaggcaagaat  
cctggctgtggaaagatacctaaaggatcaacagctcctggggatttgggggtgctctg  
gaaaactcatttgcaccactgctgtgccttggaaatgctagttaggagtaataaatctctg  
gaacagatttggaaataacatgacctggatggagtgggacagagaaattaacaattacac  
aagcttaatacactccttaattgaagaatcgcaaaaccagcaagaaagaatgaacaag  
aattattggaattagataaatgggcaagtttgtggaattggtttaacatacaaatgg  
ctgtggtatataaaaattattcataatgatagtaggaggcttggtaggtttaagaatagt  
ttttgctgtactttctatagtgaatagagttaggcagggatattcaccattatcgtttc  
agaccacctcccaatcccagggggacccgacaggcccgaaggaatagaagaagaaggt  
ggagagagagacagagacagatccattcgattagtgaacggatccttagcacttatctg  
ggacgatctgcggagcctgtgcctcttcagctaccaccgcttgagagacttactcttga  
ttgtaacgaggattgtggaacttctgggacgcagggggtgggaagccctcaaatattgg  
tggaatctcctacagtatgtgagtcaggaactaaagaatagtgtgttaacttgctcaa  
tgccacagccatagcagtagctgagtaa

gp41, but 99 bp truncation at C-terminal

**FIGURE 54B**

**Amino acid sequence of modified Env including multi-clade V3 loops, Tat and Rev  
[SEQ ID NO: 55]:**

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M T T A A E I V S K V G A P F T F R Y P T T G N A N G N T N G N R R T T I R I N K S S S E S S L A G V R Q L N M E K K V T G L D E N
R M V S C N S G F C Q S K N V R Y P A Y T N D N G N E N G N E I I T G R I K G N T F T D V N E Y K F Q A L G A E E W L L H G I L A S
V L Y D V F L A E N C L T N T P A N T N R T I N E T I N D T I R E S D K G S D T I I L I C F I K T F Y R G R E A W D Q S I I P R D L K V
K L Y A P N W G P N T A I N N G N R R T T I R I Q D I I R D I I L I C F I K T F Y R G R E A W D Q S I I P R D L K V
E G G K T M D S I K H E I T G N G N E I I T G R I K G R I R R I I T R K F G N T A G R K V A Q A R G S R N L M V I D D I Y N
K M V A D W Q C P T G E V R K N D T I R E S D K G S D T R I K S R F Q Q K G S L M L P V V A L Q I C N E Q W I N P R L V W L
Y L P Y P K S N I F I E Q K I T I R I Q D I I R D I I S D I I P R G A L K A A I Q E T P Y L G V Q G L Q L S K I Q N V R R D R T W L
Q M V D N N L T H N R V L S G R I K G R I R R I I T R V I R R I A P Y G A P H D S F W C A L G K T S S H A G S N E W G V G R S R N N
H I W T P D K S Y G P V N I N K G S D T R I K S R F Q R R I Q G H G C P H G C S S F S R P T G I S T D L V K L N K F G R P S L I L A
L C K E Q M P V C T V I Q R M S D I I P R G A L K A A I Q G A L C Q G G C Q L K G Y T I P R D E A M I L E L E Y N N L Q D I C V L T
W S E V E V C I A G V R S I R V I R R I A P Y G A P H G A P H G C V S R C A G L G C K K I D M P V G V Q R I Q T E I V G R R L E Q A
R A A H V E V T P P S S V Q Q R R I Q G H G C P H G C Q T F C V T L N R D N G Q S G R L G C Q L Y C I S Q T G Y P L F L Y I
W T T N V Q K Q A C T A E R A I Q G A L C Q G G C Q L G C Q C A R Y T F R Y I E P S S I G G D G I T Q T L T W L E N L S E V S L W A
G E T V L M L A G T Q N I G H G A P H G C V S R C A G Q C A T L P R R Y P A S Q E T N I Q N N V G S Q V K T N I L W R P G N Y G S V
W K T W V H T C F N L F N P C P H G C Q T F C V T L C T T F R Y S T P T N T R F I Q N N I S W A M N W D A N H L L I L I G H R Q A
R L L A N E P P A V L T C G L G C Q C A R Y T F R Y T F R Y P T T G N A N G A G V L T M R N R P L T N G Q V M S E W V S E S R R E E
W W F T V D L K I S L D T R G Q C A T L P R R Y P A R Y P A Y T N D N G N E K N T F E W C N S T F L L I Q P T L L Y F F E L L G L *
G V C H T I C V L T N N R A C T F R Y S T P T N T P A N T N R T I N E T I W N H N G Q S E E K L T L K L W W I D I A Q E A R W K

```

204240 500000

[illegible]

**Amino acid sequence of HIV-1 (strain BH10) Protease (PI) [SEQ ID NO: 57]:**

[illegible]

[illegible]

AtgggtgCGagagCGtCagTattaagCGgggGgaattagatCGatgggaaaaaattCG  
gttaaggCCagggggGaaagaaaaaatataaaatcatatagTatgggCaagCaggg  
agctagaacgattCGcagTtaatcctgGcctgTtagaaacatcagaaggctgtagaca  
atactgggacagctacaaccctctattgtgtgcatcaaggatagagataaaagacaccaagg  
aagctttagacaagatagaggaagagcaaaacaaaagtaagaaaaaagcacagcaagca  
gcagctgacacaggacacagcagtcaggTCagccaaaattaccctatagtgcagaacat  
ccaggggGcaaattggtacatcaggccatcacctagaactttaaatgcatgggtaaaag  
tagtagaagagaaggctttcagcccagaagtaatacccatgttttcagcattatcagaa  
ggagccaccccaagatttaaacaccatgctaaacacagTggggggacatcaagcagc  
catgcaaatgttaaagagaccatcaatgaggaagctgcagaatgggatagagtacatc  
cagTgcatgcagggcctattgCaccaggccagatgagagaaccaagggggaagtgcata  
gcaggaactactagTacccttcaggaacaaataggatggatgacaaataatccacctat  
cccagtaggagaaatttataaaagatggataatcctgggattaaataaaaatagtaagaa  
tgtatagccctaccagcattctgGacataagacaaggacccaaaagaaccttttagagac  
tatgtagaccggttctataaaactctaagagccgagcaagcttcacaggaggtaaaaaa  
ttggatgacagaaaccttgTtggtccaaaatgCGaaccCagattgtaagactattttaa  
aagcatTgggaccagcggctacactagaagaaatgatgacagcatgtcagggagtagga  
ggaccCGccataaggcaagagTtttgGctgaagcaatgagccaagtaacaaatacaGc  
taccataattgatgcagagaggcaatttttaggaaccaagaaagatggTtaagtgtttca  
attgtgGcaaagaaggGcacacagccagaaattgcagggcccctaggaaaaagggtgt  
tgGaaatgtgGaaagggaaggacaccaaataagaaatgtactgagagacaggctaattt  
cttagggaagatctggccttctacaagggaaggccagggaattttcttcagagcaga  
ccagagccaaacagccccaccatttcttcagagcagaccagagccaacagccccaccaga  
agagagcttcaggtctggggtagagacaacaactccccctcagaagcaggagccgatag  
acaaggaaactgtatcctttaacttccctcagatcactctttggcaacgacccctcgTca  
caataaagataggggggcaactaaagggaagctctattagatacaggagcagatgataca  
gtattagaagaaatgagTttgCagggaagatggaaacccaaaatgatagggggaattgg  
aggTtttatcaaagtaagacagtatgatcagatactcatagaaatctgtggacataaag  
ctataggtacagTattagtaggacctacacctgtcaacataattggaagaaatctgttg  
actcagattggTtgcactttaaatttttaa

## FIGURE 57

### Primers for multi-clade V3 loops:

Clade A: (1). forward primer A888F5 [SEQ ID NO: 60]:

5'-aaa tca acc gga att gaa ttc cct cgg gtg tac cag acc taa caa caa tac-3'  
EcoRI      Aval

(2). reverse primer A-CR3 [SEQ ID NO: 61]:

5'-att gtt ggg tct cgt aca aca atg tgc ttg tct tat atc ccc-3'

Clade C: (3). forward primer A-CF5 [SEQ ID NO: 62]:

5'-ggg gat ata aga caa gca cat tgt acg aga ccc aac aat ac-3'

(4). reverse primer C980R3 [SEQ ID NO: 63]:

5'-gtt gta ggg cct tgt gca aca atg tgc ttg tct tat atc -3'

Clade D: (5). forward primer D888F5 [SEQ ID NO: 64]:

5'-gat ata aga caa gca cat tgt tgc aca agg ccc tac aac-3'

(6). reverse primer D-ER3 [SEQ ID NO: 65]:

5'-ggt gga ggg tct ggt aca aca atg tgc tct tct tat -3'

Clade E: (7). forward primer D-EF5 [SEQ ID NO: 66]:

5' -ata aga aga gca cat tgt tgt acc aga ccc tcc acc-3'

(8). reverse primer E998R3 [SEQ ID NO: 67]:

5'-gta ttg ttg ttg ggt ctt gta caa caa tat gct ttt ctt ata tct cc-3'

Clade F: (9). forward primer F888F5 [SEQ ID NO: 68]:

5'-gga gat ata aga aaa gca tat tgt tgt aca aga ccc aac aac aat ac-3'

(10). reverse primer F-GR3 [SEQ ID NO: 69]:

5'-gtt att agg tct ggt aca aca atg tgc ctt tct gat gtc-3'

Clade G: (11). forward primer F-GF5 [SEQ ID NO: 70]:

5'-gac atc aga aag gca cat tgt tgt acc aga cct aat aac-3'

(12). reverse primer G989R3 [SEQ ID NO: 71]:

5'-aat aaa cta gtc tag acc ccc gag tct aga aca atg tgc ttg tct tat atc tcc-3'  
Aval    XbaI